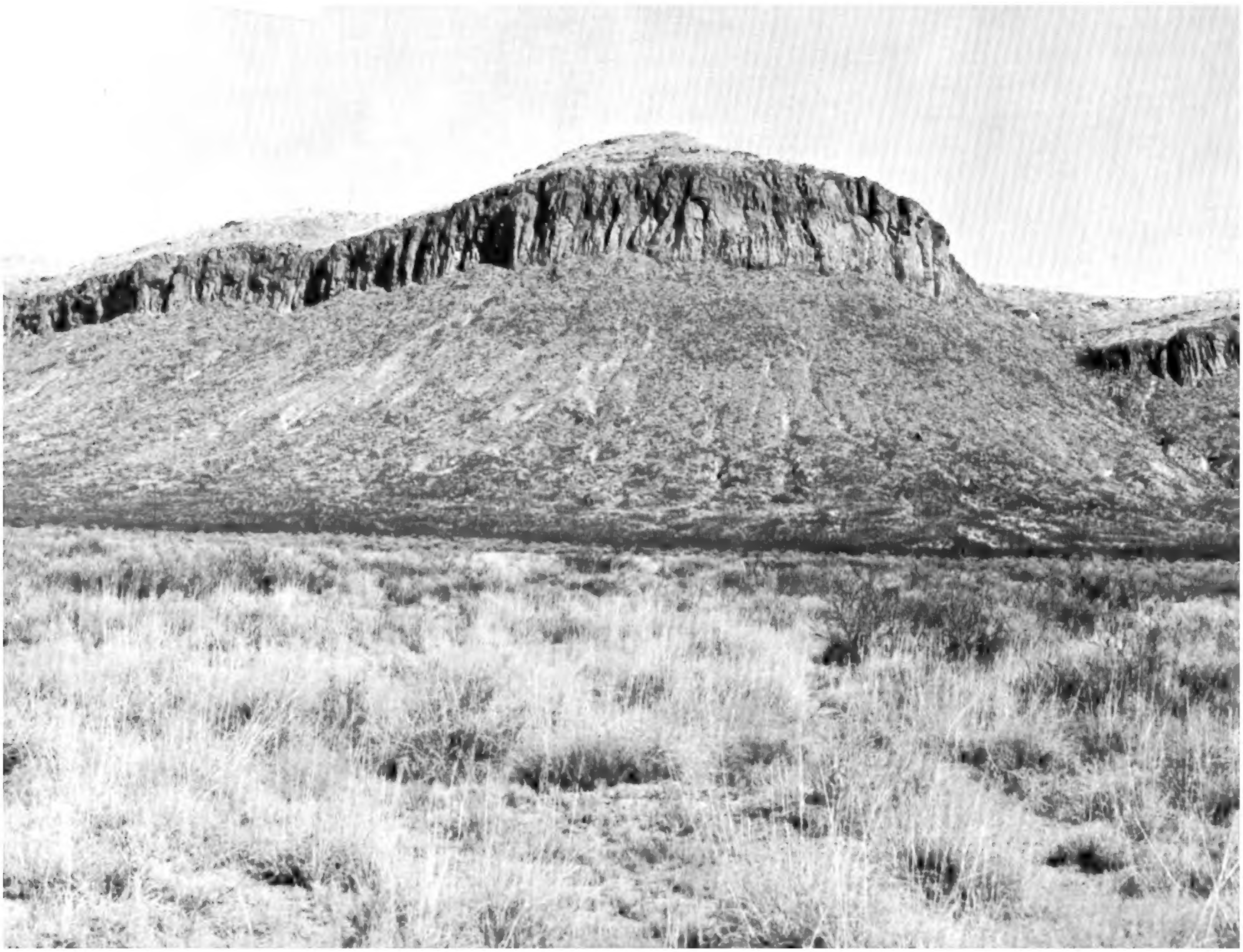
SOIL SURVEY OF

OTERO AREA, NEW MEXICO

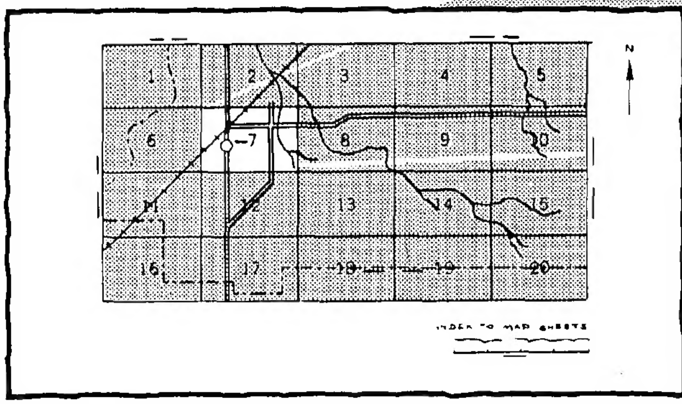
PARTS OF OTERO, EDDY, AND CHAVES COUNTIES

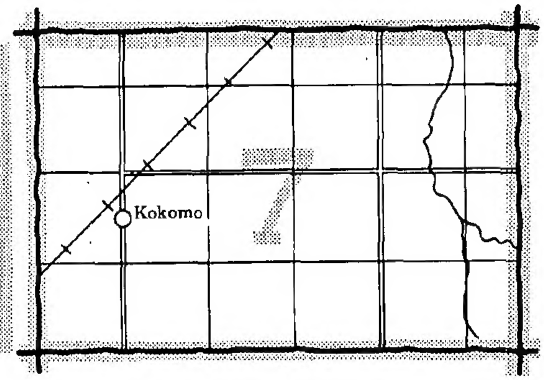


United States Department of Agriculture
Soil Conservation Service and Forest Service
in cooperation with the
New Mexico State University Agricultural Experiment Station

HOW TO USE

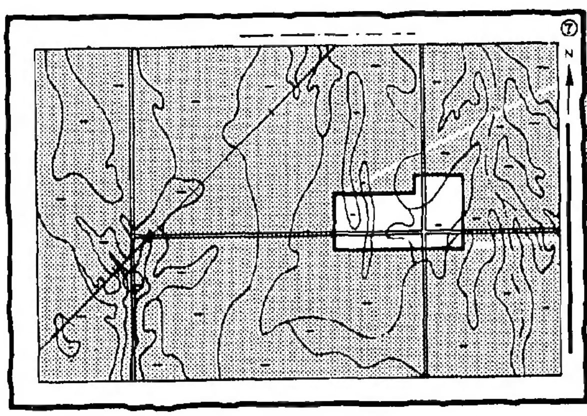
1. Locate your area of interest on the "Index to Map Sheets" (the last page of this publication).

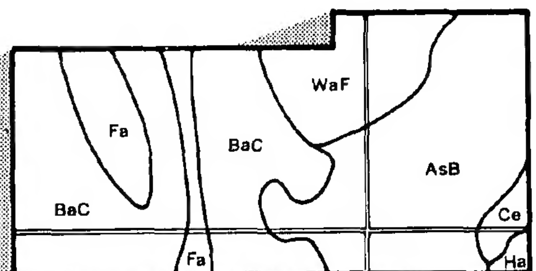




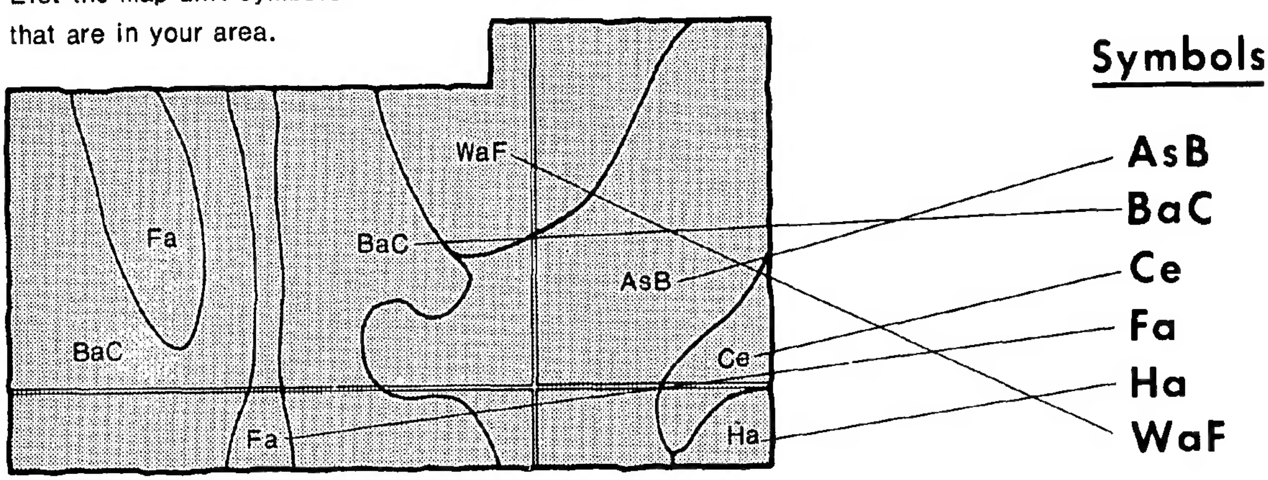
2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.



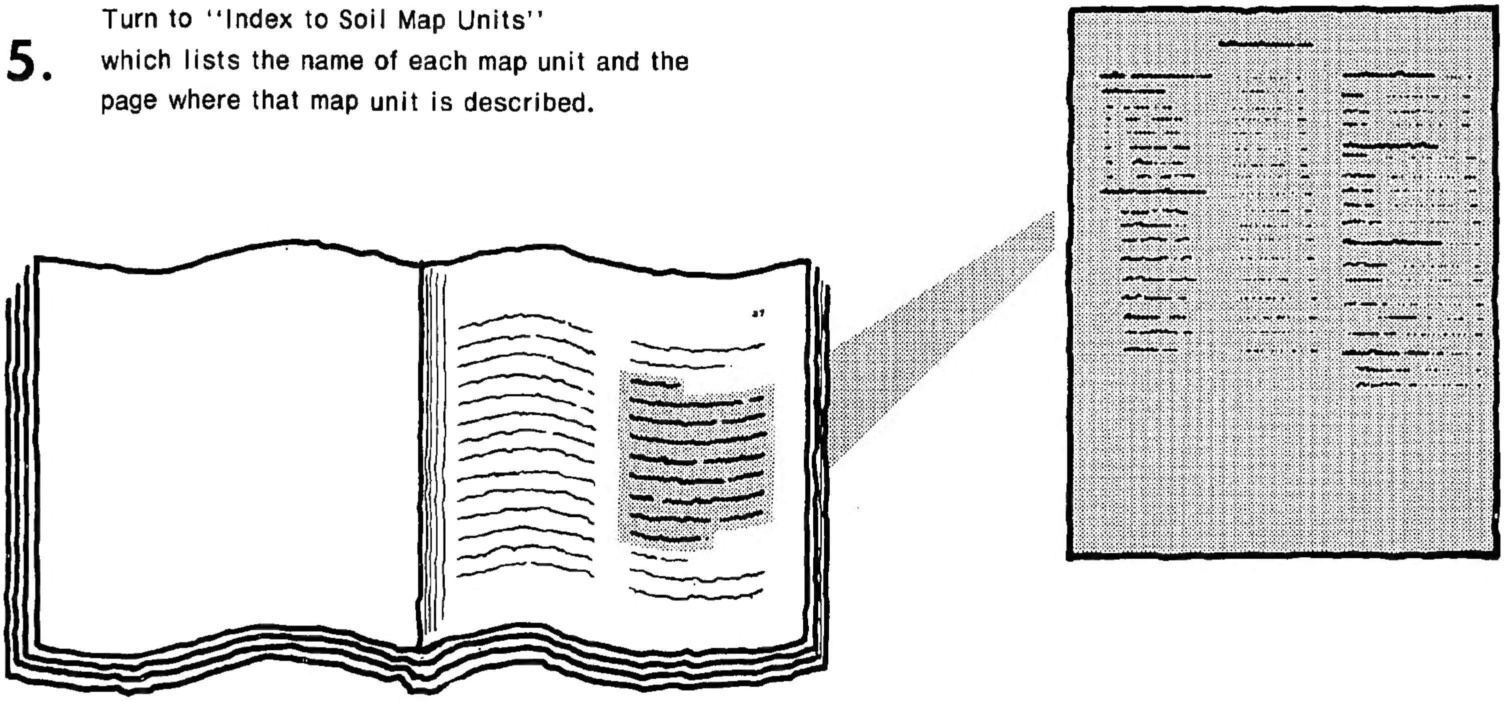


4. List the map unit symbols that are in your area.

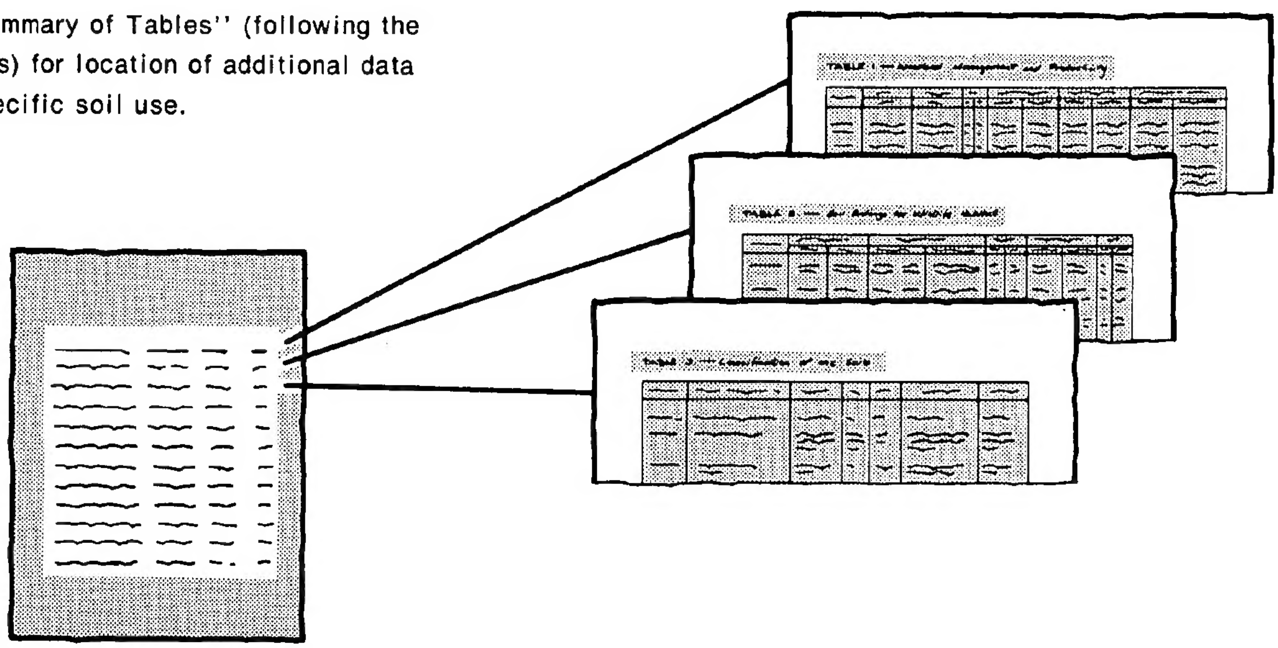


THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; to specialists in wildlife management, waste disposal, or pollution control.

This is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and agencies of the States, usually the Agricultural Experiment Stations. In some surveys, other Federal and local agencies also contribute. The Soil Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in the period 1972-1975. Soil names and descriptions were approved in 1976. Unless otherwise indicated, statements in the publication refer to conditions in the survey area in 1975. This survey was made cooperatively by the Soil Conservation Service, the Forest Service, and the New Mexico State University Agricultural Experiment Station. It is part of the technical assistance furnished to the Otero Natural Resource Conservation District and the Lincoln National Forest.

Soil maps in this survey may be copied without permission, but any enlargement of these maps can cause misunderstanding of the detail of mapping and result in erroneous interpretations. Enlarged maps do not show small areas of contrasting soils that could have been shown at a larger mapping scale.

Cover: Soils in the foreground are La Fonda association, gently sloping. The hills in the background are Pena Variant-Rock outcrop association, steep.

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Issued June 1981

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Summary of tables

Foreword

The Soil Survey of Otero Area contains much information useful in any land-planning program. Of prime importance are the predictions of soil behavior for selected land uses. Also highlighted are limitations or hazards to land uses that are inherent in the soil, improvements needed to overcome these limitations, and the impact that selected land uses will have on the environment.

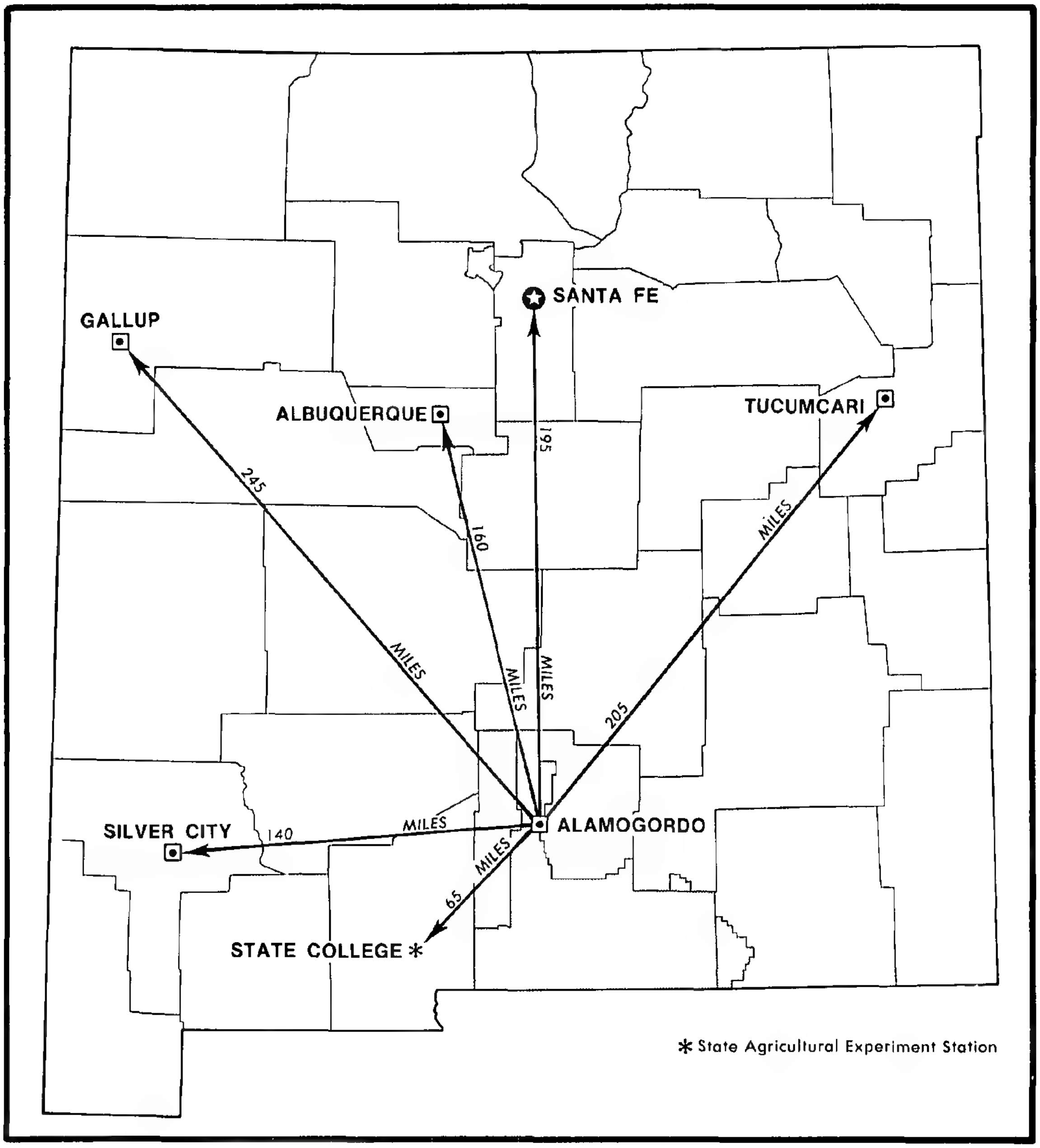
This soil survey has been prepared for many different users. Farmers, ranchers, foresters, and agronomists can use it to determine the potential of the soil and the management practices required for food and fiber production. Planners, community officials, engineers, developers, builders, and homebuyers can use it to plan land use, select sites for construction, develop soil resources, or identify any special practices that may be needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the soil survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur even within short distances. Soils may be seasonally wet or subject to flooding. They may be shallow to bedrock. They may be too unstable to be used as a foundation for buildings or roads. Very clayey or wet soils are poorly suited to septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map; the location of each kind of soil is shown on detailed soil maps. Each kind of soil in the survey area is described, and much information is given about each soil for specific uses. Additional information or assistance in using this publication can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

This soil survey can be useful in the conservation, development, and productive use of soil, water, and other resources.

A. W. Hamelstrom
State Conservationist
Soil Conservation Service



Location of Otero Area in New Mexico

SOIL SURVEY OF OTERO AREA, NEW MEXICO
PARTS OF OTERO, EDDY, AND CHAVES COUNTIES

By Phillip S. Derr, Soil Conservation Service

Soil surveyed by James T. Bayer, Phillip S. Derr, Marc Kaplan, Rodney C. Perkins, and Jerry F. Ragus, Soil Conservation Service, and Jerry Walker, Forest Service

United States Department of Agriculture, Soil Conservation Service and Forest Service, in cooperation with the New Mexico State University Agricultural Experiment Station

Otero Area, parts of Otero, Eddy, and Chaves Counties, is in south-central New Mexico (see map on facing page). The survey area covers 2,647,991 acres, or 4,137 square miles. Alamogordo, the largest city in the survey area, is the county seat of Otero County and has a population of 25,389.

The survey area is mostly in the Sonoran Desert of the Basin and Range province, but some parts are in the Great Plains province of the Interior Plains. The western part of the survey area is a closed basin which receives deposition and is the terminus of many drainage systems from the surrounding mountains and mesa escarpments. The survey area is cut lengthwise north to south by the frontal escarpments of the Sacramento and Guadalupe Mountains. The north-central and eastern parts of the area are the mountain regions of the Sacramento and Guadalupe Mountains or their fringe escarpments. The south-central part is composed of the Otero Mesa and the Crow Flats desert basin. The mesa is a rock-controlled upland dissected by many drainageways. The Crow Flats is a closed basin which drains into Texas and is bordered on the west by the Otero Mesa and on the east by the Guadalupe Mountains frontal escarpment. Elevation ranges from 3,623 feet in the southern part of Crow Flats to 7,450 feet in the southern Guadalupe Mountains. These two points are about 15 miles apart.

This survey has soil maps made at two different levels of detail. The low detail map covers the entire survey area and is especially applicable to interpreting use of large tracts of land, as for livestock grazing. The high detail map covers about 90,000 acres in the Tularosa Basin and is especially applicable to interpreting intensive uses of the soil, such as irrigated farming and urban development (fig. 1).

General nature of the area

This section gives general information concerning the survey area. It discusses climate, settlement, natural resources, and farming and ranching.

Climate

Prepared by Frank E. Houghton, former NOAA state climatologist, New Mexico.

Otero Area is the generally flat land in the Tularosa Basin, between 3,623 and 5,000 feet in elevation, and the low mountains in the southeastern part with peaks at 6,000 to 7,450 feet. The climate is arid to semiarid continental. Table 1 shows the pattern of temperature and precipitation for Alamogordo and snowfall for Orogrande. These data are generally representative of the basin. Bordering foothills have more precipitation and lower temperatures than the basin proper, but few data are available on these areas.

Average annual precipitation ranges from 8 to 11 inches in the basin and from 12 to 18 inches at higher elevations. The main source of moisture in the rainy season is moist air from over the Gulf of Mexico in the general circulation about the Bermuda high pressure area, which shifts westward in summer. Mountains east of the area receive more precipitation than the basin, somewhat reducing the amount that reaches the Tularosa Basin. About 60 percent of the annual precipitation falls from July to October, most from brief, but sometimes heavy, thunderstorms. There is an average of 45 thunderstorms a year. Prolonged rainy periods are practically unknown, and most of the area is arid. The main source of moisture in winter is eastward-moving storms from over the Pacific Ocean. Much of the moisture in these storms is lost over the mountains west of New Mexico, and winter and spring average one-half inch of rain per month.

Precipitation varies greatly from year to year and from month to month. At Orogrande, 22.55 inches fell in 1905 and 2.93 inches in 1934. At Tularosa, 9.82 inches fell in September 1941 and none in September 1918. At Lulu, 6.50 inches fell on June 29, 1950. An average of 15 to 21 days per year have 0.10 inch or more of precipitation, and an average of 2 to 4 days per year have precipitation of 0.50 inch or more.

Snow may fall from November through March. Total annual snowfall ranges from 3 to 5 inches in the basin and from 12 to 25 inches at higher elevations. Snow seldom stays on the ground for more than a day in the basin.

Mean annual temperature ranges from 58 to 62 degrees. Most days from mid-May to mid-September have a temperature of 90 degrees or higher. The extreme high temperature was 116 degrees at Orogrande on July 14, 1934. The average number of days with freezing temperatures ranges from 80 to 100 per year, mostly between mid-November and mid-March. Few days have zero temperatures, and few days remain freezing. The extreme low temperature was 14 degrees below zero at Alamogordo on January 11, 1962.

The freeze-free period averages 7 months, from early April to early November, and is 219 days at Orogrande. Table 2 shows probable dates of the first freezing temperature in spring and the last in fall for Alamogordo, and these are generally representative of the area.

Sunshine averages about 3,500 hours per year, or nearly 80 percent of the possible hours, with monthly percentages fairly evenly distributed throughout the year. Relative humidity is quite low. At Alamogordo it ranges from 40 to 65 percent in the early morning, from 30 to 35 percent on summer afternoons of the rainy season, and from 15 to 25 percent in the afternoons of the drier spring. Evaporation, estimated from Class A pan measurements at nearby weather stations, is 100 inches a year, 67 inches of which occurs from May to October. Windspeed generally averages about 10 miles per hour, but is somewhat stronger in spring. The stronger winds usually are from the west or southwest. In late winter and spring, with dry ground, the stronger winds may cause considerable blowing dust.

Settlement

The history of the Area is important because it relates not only to points of interest but also to proper land use planning. Many sites reflecting early use and occupation have been placed in the State Register of Cultural Properties.

Occupation of the Otero Area started with pre-Columbian settlement by Indians. The earliest record of man in the Otero Area is at the Alamogordo sites and dates from about 2000 B.C. The Jornada branch of the Mogollon Culture lived in the northern part of the Area at Three Rivers Petroglyph and Pueblo site from A.D. 1050 to 1200.

Juan de Onate and his soldier-colonists arrived at San Pueblo in 1598, and the period of Spanish conquest and settlement in New Mexico began. In 1821 the Treaty of Cordova, marking the independence of Mexico from Spain, was signed. New Mexico remained under Mexican sovereignty until August 18, 1846, when it became a territory of the United States.

Early colonists settled at the foot of the Sacramento Mountains at Tularosa in 1860. Their primary concern was the development of irrigation systems along the Tularosa River. In 1898, Alamogordo was the headquarters of the El Paso Northeastern Railroad, and the railroad was extended into the Sacramento Mountains. This opened timber resources to logging operations, which were a primary source of income for people in the basin and mountain area. The railroad later became part of the Southern Pacific system and still carries freight. The rail extension into the mountains was abandoned in 1947.

Otero County was created in 1899, when existing county governments grew inefficient because of their large size. Its 4,248,300 acres were taken from parts of Dona Ana, Lincoln, and Socorro Counties. Alamogordo was selected as the county seat.

White Sands National Monument was created in 1933. It borders the survey area west of Holloman Air Force Base and is the largest area of gypsum dunes in the world.

The area remained more or less stable until the Second World War, at which time expansion resulted from the establishment of the Alamogordo Army Airfield (Holloman Air Force Base) and subsequent increase in personnel. With the creation of the White Sands Missile Range and the solar observatory at Sunspot the military became a dominant and influential factor in nonagricultural development in the basin areas.

Alamogordo, the county seat, has a population of about 25,389. The new Space Hall of Fame, creation of new industrial parks, and potential popularity of the area for retirement will influence further population growth.

Agriculture is still a primary source of income in the survey area. Areas around Alamogordo, Tularosa, La Luz, and Boles Acres, New Mexico, and Dell City, Texas, are irrigated. Most of the Area is used for domestic livestock grazing, cattle or sheep, and for military purposes. About 89 percent of the survey area is State or Federally owned. Much of the private land, which was previously rangeland, is being developed into either urban areas or 5- to 10-acre ranchettes. Prior planning helps to prevent prime farmland and wildlife habitat from being lost for future needs.

Natural resources

Soil is the most important natural resource in the survey area. Livestock that graze the grassland and

crops that are produced under irrigation are marketable products derived from the soil.

In most of the survey area, water is limited (*6*). In the Tularosa Basin, salt water is encroaching from the basin floor towards the underground fresh water at the base of the Sacramento Escarpment. As more wells are developed and the use of fresh water increases, this encroachment will become more severe. Water in the rest of the survey area is more limited than in the basin. Even adequate livestock water is very difficult to obtain, and much of the potential rangeland is not used to its full potential because of lack of domestic livestock watering facilities.

Very little commercial timber is present in the survey area, but timber does occur in abundance in the contiguous Sacramento Mountains a few miles east of Alamogordo. Pinyon pine and juniper grow in the Guadalupe Mountains and Pinon area and are used for fence posts and firewood. Two sawmills in Alamogordo receive timber from the Sacramento Mountains.

Abundant wildlife draws many persons into this area. Game species such as mule deer, white-tailed deer, pronghorn antelope, elk, black bear, turkey, quail, and dove are present in different parts of the survey area. Nongame birds are quite common and because of the extremes in climates and elevations are quite varied, providing excellent subjects for wildlife study and observation.

The Tularosa Basin contains one of the largest saline water aquifers in the United States, but this water is not used.

Farming and ranching

The first major use of the Otero Area by non-Indian settlers was cattle and sheep ranching. The area was divided into vast holdings by a relatively small number of ranchers. In 1860, at the present site of Tularosa, settlers established a community and used water from the Tularosa River for irrigation. Very little dryland farming was attempted because of the small amount and erratic pattern of rainfall throughout most of the survey area.

Lack of quality irrigation water and vast Federal land holdings have restricted farming to the area along the foot of the Sacramento Mountains in the Tularosa Basin and the area just north of Dell City, Texas, in the Crow Flats. Crops most commonly grown now are barley, oats, wheat, some grain sorghum, alfalfa, and cotton. Most irrigation water is slightly saline to saline because of the gypsum and sodium content. The salinity restricts production of most crops to some degree. There is 16,250 acres of irrigated farm land presently used for row crops and irrigated pasture in the survey area.

Cattle and sheep ranching is still the major use of most land in the survey area. Some parts of the military lands are leased by ranchers for grazing domestic livestock. Most areas of military land, however, are used only for military purposes and wildlife habitat.

Because of the vast Federal land holding, farming and ranching is expected to remain constant or decrease. Much of the farmland is being urbanized and subdivided into 5- to 10-acre ranchettes. The lack of quality water restricts their development and puts a burden on existing facilities.

How this survey was made

Soil scientists made this survey to learn what kinds of soil are in the survey area, where they are, and how they can be used. The soil scientists went into the area knowing they likely would locate many soils they already knew something about and perhaps identify some they had never seen before. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; the kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material, which has been changed very little by leaching or by the action of plant roots.

The soil scientists recorded the characteristics of the profiles they studied, and they compared those profiles with others in counties nearby and in places more distant. Thus, through correlation, they classified and named the soils according to nationwide, uniform procedures.

After a guide for classifying and naming the soils was worked out, the soil scientists drew the boundaries of the soils on aerial photographs. These photographs show woodlands, buildings, field borders, roads, and other details that help in drawing boundaries accurately. In this survey, two detailed soil maps—low detail and high detail—were prepared from these aerial photographs and are included at the back of this publication.

The areas shown on a soil map are called soil map units. Some map units are made up of one kind of soil, others are made up of two or more kinds of soil, and a few have little or no soil material at all. Map units are discussed in the sections "General soil map for broad land use planning" and "Soil maps for detailed planning."

Soils mapped at low detail were examined at wide intervals, and the map units are broadly defined. Composition of these map units is variable but has been controlled well enough for the soils to be interpreted for their expected uses. Although the low detail map was designed primarily for planning use of generally large tracts of land, as for livestock grazing or wildlife habitat, interpretations for intensive uses are made for the major soils in each map unit in tables. (See "Summary of tables.")

An area of about 90,000 acres in the Tularosa Basin, including the cities of Tularosa and Alamogordo, Holloman Air Force Base, and most of the irrigated land in the Area, was also mapped at high detail. In this area the soils were examined at closer intervals than for the low detail map and the map units are narrowly defined. The units on the high detail map are suitable for planning intensive uses of the soil, such as irrigated farming or urban development.

While a soil survey is in progress, samples of soils are taken as needed for laboratory measurements and for engineering tests. The soils are field tested, and interpretations of their behavior are modified as necessary during the course of the survey. New interpretations are added to meet local needs, mainly through field observations of different kinds of soil in different uses under different levels of management. Also, data are assembled from other sources, such as test results, records, field experience, and information available from state and local specialists. For example, data on crop yields under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it is readily available to different groups of users, among them farmers, managers of rangeland and woodland, engineers, planners, developers and builders, homebuyers, and those seeking recreation.

General soil map for broad land use planning

The general soil map at the back of this publication shows, in color, map units that have a distinct pattern of soils and of relief and drainage. Each map unit is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

The general soil map provides a broad perspective of the soils and landscapes in the survey area. It provides a basis for comparing the potential of large areas for general kinds of land use. Areas that are, for the most part, suited to certain kinds of farming or to other land uses can be identified on the map. Likewise, areas of soils having properties that are distinctly unfavorable for certain land uses can be located.

Because of its small scale, the map does not show the kind of soil at a specific site. Thus, it is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The kinds of soil in any one map unit differ from place to place in slope, depth, stoniness, drainage, or other characteristics that affect their management.

Descriptions of the general soil map units

Shallow to deep, well drained soils that formed in gypsiferous material

The soils in units 1, 2, and 3 are in the Tularosa Basin and Crow Flats. The mean annual precipitation is about 8 to 10 inches, and the mean annual air temperature is 60 to 64 degrees F. Elevation ranges from 3,800 to 5,500 feet. These soils make up 9 percent of the survey area.

These soils are used mainly for grazing, wildlife habitat, and military purposes. Near urban areas the soils are also used for homesites and other urban developments.

1. Alamogordo-Gypsum land-Aztec

Deep, well drained, nearly level to moderately steep soils on alluvial fans and pediments and Gypsum land

This map unit is in the western part of the survey area. These soils are on nearly level alluvial fans to moderately steep side slopes of dissected pediments (fig. 2).

This unit covers about 4 percent of the survey area. It is about 35 percent Alamogordo soils, 30 percent Gypsum land, 15 percent Aztec soils, and 20 percent soils of minor extent.

Alamogordo soils are mainly nearly level to gently sloping but range to moderately steep. They are loamy and contain gypsum throughout. Gypsum land occurs throughout the entire area and is exposed bedded gypsum. Aztec soils are gently sloping to moderately steep. They are very gravelly throughout and contain gypsum throughout.

Minor in this unit are Tome, Lozier, and Holloman soils and Badland. Tome soils are in drainageways. Holloman soils are associated with Gypsum land. Badland is east of Tularosa.

These soils are used mainly for domestic livestock grazing and wildlife habitat. Some areas are undergoing urbanization and are used for small ranchettes. The soils provide only marginal grazing because of the fragile nature of the surface; however, in the wetter areas good stands of grasses and forbs can be maintained if properly managed.

The potential for residential and urban uses is high because of location. These uses are severely limited by the high gypsum content. Low strength, corrosivity to utility lines and pipe, and piping must be overcome. The potential for farming is low because of the gypsum content, salinity, gravel content, and moderately steep slope in some areas.

The potential of these soils for wildlife habitat is moderate. The soils produce native plants that provide food and cover for scaled and Gambel quail, mourning and

white-winged dove, pronghorn antelope, mule deer, and desert bighorn.

2. Holloman-Gypsum land-Yesum

Shallow and deep, well drained, nearly level to gently sloping soils on uplands and basin floors, and Gypsum land

This map unit is on dissected relic eolian uplands and basin floors along the western edge and in the southeastern part of the survey area. These areas are underlain by thickly bedded gypsum deposits.

This unit covers about 3 percent of the survey area. It is about 35 percent Holloman soils, 30 percent Gypsum land, 15 percent Yesum soils, and 20 percent soils of minor extent.

Holloman soils are throughout the unit. Holloman soils are loamy throughout and high in gypsum and are less than 20 inches thick over unconsolidated gypsum. Gypsum land is throughout the unit and along and margins of dissected stream beds. Yesum soils are throughout but are mostly on the western edge of the unit. They are deep and loamy and are high in gypsum.

Minor in this unit are Reeves, Prelo, Largo, Tome, Bluepoint, and Alamogordo soils.

These soils are used mainly for grazing. In most areas fair to good stands of grasses and forbs are produced. The soils are very fragile, however, and any misuse allows undesirable shrubs to replace the grasses. Erosion potential is very high on these soils if the plant cover is removed.

The potential for residential or urban use is low because of the low strength, high gypsum content, and corrosivity of these soils.

The potential for wildlife habitat is low but can be improved by building watering facilities. These soils produce native plants that provide food and cover for scaled and Gambel quail, mourning and white-winged dove, pronghorn antelope, and mule deer.

3. Holloman-Reeves-Gypsum land

Shallow and deep, well drained, nearly level to gently sloping soils on uplands and valley floors, and Gypsum land

This map unit is on dissected uplands and depressional valley floors along the western edge of the survey area. These areas are underlain by thickly bedded gypsum deposits.

This unit covers about 2 percent of the survey area. It is about 35 percent Holloman soils, 30 percent Reeves soils, 20 percent Gypsum land, and 15 percent soils of minor extent.

Holloman soils are throughout the unit. They are loamy throughout, are high in gypsum, and are less than 20 inches thick over unconsolidated gypsum. Reeves soils occur throughout the depressional areas. They have a loamy surface layer and silty subsoil, and their substratum is high in gypsum. Gypsum land is throughout the unit and along the margins of streambeds.

Minor in this unit are Alamogordo and Tome soils. Alamogordo soils are intermixed with the Holloman soils. Tome soils are in the wider depressional areas with the Reeves soils.

These soils are used mainly for grazing. In most areas poor to fair stands of grasses and forbs are produced. The soils are very fragile and any misuse causes severe erosion.

The potential for residential use is low because of low strength, high gypsum content, and corrosivity of the Holloman soils. In large areas of the Reeves soils, the limitations are less severe than in the Holloman soils and the potential for residential use is moderate.

The potential for wildlife habitat is low. These soils produce native plants that provide food and cover for scaled and Gambel quail, mourning and white-winged dove, and pronghorn antelope.

Shallow, well drained soils that formed in material derived from limestone

The soils in units 4, 5, and 6 are on mountain foot slopes and escarpments. The mean annual precipitation is 9 inches on Lozier soils and 14 to 15 inches on Deama, Tortugas, and Ector soils. The mean annual air temperature is 60 to 61 degrees F in areas of Lozier and Ector soils and 51 to 52 degrees in areas of Deama and Tortugas soils. Elevation ranges from 4,000 to 7,450 feet. These soils make up about 41 percent of the survey area.

These soils are used mainly for grazing and wildlife habitat.

4. Deama-Tortugas-Rock outcrop

Shallow, well drained, nearly level to very steep soils on limestone hills and mountains, and Rock outcrop

This map unit is in the eastern and northwestern parts of the survey area.

This unit covers about 11 percent of the survey area. It is about 30 percent Deama soils, 30 percent Tortugas soils, 15 percent limestone Rock outcrop, and 25 percent soils of minor extent.

Deama soils are intermixed with the Rock outcrop on uplands. Deama soils are very gravelly and are less than 20 inches thick over bedrock. Tortugas soils are cobbly and are less than 20 inches thick over bedrock. Rock outcrop occurs as ledges, escarpments, and isolated buried boulders throughout the unit. It is primarily limestone but may be dolomite.

Minor in this unit are Montecito, Dye, Encierro, Tortugas, Lozier, and Borrego soils.

These soils are used mainly for grazing, wildlife habitat, and associated recreation. Most of this area affords

adequate grazing for domestic livestock; however, care must be taken to avoid overuse because of the slow recovery and fragile nature of the soils. Game species are common, and hunting is the primary type of recreation.

This unit, when properly managed, can support or maintain its present level of use. The potential for other uses is low because of the shallow soils, steep slopes, and amount of Rock outcrop.

The potential of these soils for wildlife habitat is low to moderate. These soils produce native plants that provide food and cover for scaled and harlequin quail and wild turkey and for mountain lion, black bear, white-tailed deer, mule deer, elk, pronghorn antelope, and bighorn.

5. Ector-Rock outcrop

Shallow, well drained, moderately steep to steep soils on limestone hills, and Rock outcrop

This map unit is in the north-central and eastern parts of the survey area.

This unit covers about 4 percent of the survey area. It is about 45 percent Ector soils, 40 percent limestone outcrop, and 15 percent soils of minor extent.

Ector soils occur intermixed with Rock outcrop throughout the unit. The Ector soils are very gravelly and are less than 20 inches thick over bedrock. Rock outcrop occurs as escarpments, embedded boulders, ledges, or rock slides throughout the mapped areas. It is primarily limestone, but some is dolomite.

Minor in this unit are Tortugas, Deama, and Lozier soils. They occur primarily on the margins or fringes of the Ector soils.

These soils are used mainly for grazing and wildlife habitat. Most of this area provides good grazing for domestic livestock and wildlife. Care is needed to maintain the plant cover because of the high erosion potential. Game species are common and much of the area is hunted.

If properly managed, these soils support excellent stands of grasses and forbs for domestic livestock and large wildlife.

The potential for other uses, such as residential or urban use and farming, is low because of the steep slopes, shallow soils, and Rock outcrop.

The potential of these soils for wildlife habitat is moderate. These soils produce native plants that provide food and cover for scaled, harlequin, and Gambel quail, mourning and white-winged dove, pronghorn antelope, mule deer, and desert bighorn.

6. Lozier-Rock outcrop

Shallow, well drained, nearly level to steep soils on limestone hills, and Rock outcrop

This map unit is throughout the eastern, western, and central parts of the survey area (fig. 3).

This unit covers about 26 percent of the survey area. It is about 40 percent Lozier soils, 40 percent limestone outcrop, and 20 percent soils of minor extent.

Lozier soils are intermixed with the Rock outcrop. Lozier soils are very gravelly and are less than 20 inches thick over bedrock. Rock outcrop occurs as catstep escarpments, ledges, or ridge crests throughout most of the area. It is limestone and may be highly fractured in some areas. Colluvial rock slides are in some areas.

Minor in this unit are Tencee, Nickel, and Ector soils. Tencee and Nickel soils are on foot slopes, and Ector soils are in the higher and more moist positions. Large areas of interbedded gypsum are on the western mountain frontal escarpments.

These soils are used mainly for grazing and wildlife habitat. Some areas of this unit provide adequate grazing for domestic livestock or wildlife; however, many areas have very little usable forage because of past use. If the plant cover is removed, erosion depletes the soil and only a few species of hardy cacti survive.

This unit has low potential for residential or urban use and farming because of the steep slopes, shallow soils, and Rock outcrop.

The potential of these soils for wildlife habitat is moderate. These soils produce native plants that provide food and cover for scaled and Gambel quail, mourning dove, mule deer, and desert bighorn.

Shallow to deep, well drained and somewhat excessively drained soils that formed in alluvial and eolian material

The soils in units 7 through 14 are on the basin floors of the Tularosa Basin and Crow Flats, on Otero Mesa, and on mountains and foot slopes. The mean annual precipitation ranges from 8 to 15 inches, and the mean annual air temperature is 51 to 63 degrees F. Elevation ranges from 3,800 to 6,900 feet. These soils make up about 50 percent of the survey area.

These soils are used mainly for grazing, wildlife habitat, and military purposes. Large areas near Alamogordo and Tularosa are used for irrigated farming.

7. Tome-Mimbres

Deep, well drained, nearly level to gently sloping soils on alluvial fans and valley floors

This map unit is in the eastern, central, and western parts of the survey area.

This unit covers about 8 percent of the survey area. It is about 50 percent Tome soils, 40 percent Mimbres soils, and 10 percent soils of minor extent.

Tome soils have stratified layers of silt loam. Mimbres soils in most places are slightly lower in position than the Tome soils. Mimbres soils are silt loam and silty clay loam.

Minor in this unit are Jal, Prelo, and Reyab soils.

These soils are used mainly for military purposes, since most areas are on military reservations. Those areas on private land are used for grazing, homesites, and limited farming. Some areas receive runoff from surrounding areas, which may cause localized flooding.

The potential for residential or urban use is high in privately owned areas. The potential for farm crops is high. The major limitations for use are potential flooding in some areas and the moderately slow permeability of the soil.

The potential for wildlife habitat is moderate. These soils produce native plants that provide food and cover for scaled and Gambel quail, mourning and white-winged dove, pronghorn antelope, and mule deer.

8. Prelo-Tome-Largo

Deep, well drained, nearly level to gently sloping soils on alluvial fans, valley floors, and pediments

This map unit is in the northwestern part of the survey area.

This unit covers about 3 percent of the survey area. It is about 25 percent Prelo soils, 25 percent Tome soils, 25 percent Largo soils, and 25 percent soils of minor extent.

Prelo soils are in lower lying positions in the western parts of the unit. They are silt loam and silty clay loam. Tome soils are on alluvial fans and valley floors throughout the unit. They are stratified silt loam. Largo soils are on upper parts of the unit on sides of pediments. They formed in alluvial sediment from Triassic red beds and are silt loam and silty clay loam.

Minor in this unit are Mimbres, Jal, Ogral, and McCullough soils. All of these soils are similar and are scattered throughout the unit. Alamogordo soils, which have a high content of gypsum, are also in this unit.

These soils are used mainly for grazing, irrigated crops, and urbanization. They produce fair to good stands of grasses for grazing if managed well; however, much of the area has been misused and now supports only shrubs. The two major towns in the survey area are built on these soils and almost all of the irrigated crops are in this unit. The moderately slowly permeable subsoil, erosion hazard, and low strength of all of the soils must be overcome when using these soils.

The potential for wildlife habitat is moderate to high. These soils produce native plants that provide food and cover for scaled and Gambel quail, mourning and white-winged dove, and in some areas pronghorn antelope.

9. Reakor-Tome-Tencee

Deep and shallow, well drained, nearly level to moderately sloping soils on uplands, valley floors, and pediment toe slopes

This map unit is at the base of limestone hills in the east-central part of the survey area (fig. 3).

This unit covers about 8 percent of the survey area. It is about 35 percent Reakor soils, 30 percent Tome soils, 20 percent Tencee soils, and 15 percent soils of minor extent.

Reakor soils are in midslope upland positions. They have a silty loam subsoil and lime accumulation in the subsoil and substratum. Tome soils are mainly on the valley floor but are on uplands in places. They are stratified silt loam. The Tencee soils are on the upper parts of sides of pediments. They are very gravelly and overlie a thick, strongly cemented lime layer at a depth of less than 20 inches.

Minor in this unit are Lozier soils, which overlie bedrock on the upper part of pediments. Some small areas of Philder and Reyab soils are along the western fringe of this unit.

These soils are used mainly for grazing and wildlife habitat, but some small areas of Reakor and Tome soils are used for irrigated pasture. Much of this area has been overused and supports nonusable shrub species; however, under good management other areas produce good forage for grazing by livestock and wildlife. Water limits both grazing and irrigation. Tencee soils are too shallow to irrigate.

The potential of these soils for other uses is low, mainly because of location. Reakor and Tome soils have no severe limitations for most uses, but the shallow, gravelly Tencee soils are limited for most uses other than grazing and wildlife habitat.

The potential for wildlife habitat is low. These soils produce native plants that provide food and cover for scaled and Gambel quail, mourning and white-winged dove, and pronghorn antelope.

10. Philder-Armesa-Reyab

Shallow and deep, well drained, nearly level to rolling soils on alluvial fans and uplands

This map unit is on broad uplands on the Otero Mesa in the south-central part of the survey area. This mesa is a relic position much older than many other surfaces in the survey area (fig. 4).

This unit covers about 11 percent of the survey area. It is about 60 percent Philder soils, 20 percent Armesa soils, 15 percent Reyab soils, and 5 percent soils of minor extent.

Philder soils are on the undulating to moderately rolling hills. They are shallow, have a strongly cemented lime zone at a depth of less than 20 inches, and are loamy. Armesa soils are on the nearly level uplands and occur mostly in the northern part of the unit. They are deep and loamy and have a strong lime zone in the subsoil and substratum. Reyab soils are mainly on narrow to broad bottom lands and in drainageways. They are deep and silty.

Minor in this unit are Jerag, Tome, Tencee, and Lozier soils.

These soils are used mainly for grazing, wildlife habitat, and military purposes. They are primarily grassland with some shrubs that have invaded. Much of the area is on the McGreggor Missile Range, and use is limited to wildlife habitat and grazing. During most years under good management, forage production is good.

This unit has low potential for urban or residential use because of location and not because of soil limitations. Reyab and Armesa soils have moderate to high potential for irrigated crops, but this use is limited by lack of water in quantities necessary for irrigation.

The potential for wildlife habitat is moderate. These soils produce native plants that provide food and cover for scaled and Gambel quail, mourning and white-winged dove, pronghorn antelope, and mule deer.

11. Nickel-Tencee

Deep and shallow, well drained, strongly sloping to moderately steep soils on pediment toe slopes and alluvial fans

This unit covers about 5 percent of the survey area. It is about 50 percent Nickel soils, 35 percent Tencee soils, and 15 percent soils of minor extent.

Nickel soils are mainly on alluvial fans and lower parts of the sides of pediments. They are deep and are gravelly to very gravelly throughout. Tencee soils are shallow and are mainly on the upper parts of sides of pediments and alluvial fans. They are very gravelly throughout and have a zone of carbonate-cemented material at a depth of less than 20 inches.

Minor in this unit are Lozier, Tome, Reakor, and Aztec soils and Rock outcrop. Aztec soils are mainly along the mountain foot slopes near Tularosa and Alamogordo.

These soils are used mainly for grazing, but in some areas near communities they are used for residential purposes. The slope, very gravelly spots, and shallow depth limit urbanization, farming, and recreation.

The potential for residential use, farming, and recreation is low; however, because of location some areas will be used for residential purposes. Extreme care should be taken when leveling for foundations since the fill material does not pack easily and is subject to sloughing or settling under a load.

The potential for wildlife habitat is low to moderate. These soils produce native plants that provide food and cover for scaled and Gambel quail, mourning and white-winged dove, pronghorn antelope, mule deer, and desert bighorn.

12. Bluepoint-Onite-Wink

Deep, somewhat excessively drained and well drained, level to undulating soils on uplands and alluvial fans

This map unit is in the northwestern and western parts of the survey area. It is on eolian uplands.

This unit covers about 2 percent of the survey area. It is about 30 percent Bluepoint soils, 30 percent Onite soils, 25 percent Wink soils, and 15 percent soils of minor extent.

Bluepoint soils are on coppice dunes and hummocks. Bluepoint soils are somewhat excessively drained and are sandy. Onite and Wink soils are between the dunes and are well drained. The Onite soils have a sandy surface layer and a loamy subsoil. The Wink soils are loamy throughout and are high in lime in the substratum.

Minor in this unit are Pintura, Berino, Holloman, and Alamogordo soils.

These soils are used mainly for grazing and wildlife habitat. They are highly erodible, but support good to fair stands of grasses and forbs if managed properly. Water is the limiting factor in using these soils because no natural flow occurs in areas of these soils.

The potential for residential or urban use is low because of the erodibility of the Bluepoint soils. The soils themselves have no other limitations for this use. The location of these soils is limiting, however, since they now are mostly in State or Federal land.

The potential for wildlife habitat is moderate. These soils produce native plants that provide food and cover for scaled and Gambel quail, mourning and white-winged dove, pronghorn antelope, mule deer, and desert bighorn.

13. Pintura-Dona Ana

Deep, somewhat excessively drained and well drained, undulating soils on duned uplands

This map unit is on uplands in the southwestern part of the survey area. It occupies broad duned areas (fig. 5).

This unit covers about 12 percent of the survey area. It is about 45 percent Pintura soils, 35 percent Dona Ana soils, and 20 percent soils of minor extent.

Pintura soils are on coppice dunes 3 to 30 feet high. The soils are sandy throughout and are somewhat excessively drained. Dona Ana soils are between the dunes. They have a loamy profile and a substratum high in lime and are well drained.

Minor in this unit are Berino, Onite, Tome, Wink, and Bluepoint soils. These soils are intermixed throughout the unit.

These soils are used mainly for grazing and military purposes. They are very fragile, but when managed properly they produce good stands of grasses and forage for livestock. Because of past misuse, many areas support only mesquite on the dunes. The area should be disturbed as little as possible because of potential wind erosion. Fort Bliss and the McGreggor Missile Range use the association for military purposes.

These soils have low potential for irrigated crops or urban use, mostly because of location. Also, the dunes

would have to be leveled, but stabilization is difficult because of the sandy texture and severe erosion hazard.

These soils have low to moderate potential for wildlife habitat. They produce native plants that provide food and cover for scaled and Gambel quail, mourning and white-winged dove, and pronghorn antelope.

14. Pena-Cale-Kerrick

Deep, moderately well drained, nearly level to moderately sloping soils in upland valleys

This map unit is in dissected upland valleys surrounded by limestone hills in the north-central and northwestern parts of the survey area.

This unit covers about 1 percent of the survey area. It is about 35 percent Pena soils, 30 percent Cale soils, 20 percent Kerrick soils, and 15 percent soils of minor extent.

Pena soils are on side slopes above the Cale soils and below the Kerrick soils. Pena soils have a loamy surface layer and a very gravelly substratum. Cale soils are in depressional areas. They are silty throughout. Kerrick soils are on ridge crests. They are silty throughout and overlie an indurated lime layer at a depth of 25 inches.

Minor in this unit are Ruidoso, Shanta, Gabaldon, Deama, and Ector soils.

These soils are used almost exclusively for grazing and wildlife habitat. The potential for grazing is high, but care must be taken not to reduce surface cover, since the surface of these soils is subject to both wind and water erosion.

The potential for residential use is moderate. Because of location, use for ranch homesites and outbuildings is expected. There are no major limitations except the moderate depth to a very hard lime layer. The potential for irrigated crops is high on the Cale soils but low on the Pena and Kerrick soils.

The potential for wildlife habitat is moderate. These soils produce native plants that provide food and cover for scaled and harlequin quail and wild turkey and for mountain lion, black bear, white-tailed and mule deer, elk, and pronghorn antelope.

Broad land use considerations

Deciding which soils should be used for residential or urban development is an important issue in the survey area. Each year a considerable acreage is developed for residential and urban uses in and around Alamogordo, La Luz, Tularosa, Boles Acres and other areas in the basin. About 5,000 acres per year is being converted to homesites, urban areas, and 1- to 10-acre ranchettes. The general soil map is very helpful in planning residential or urban use. The soils that have good potential for cultivated crops also have good potential for residential and urban development. The data about specific soils in other parts of this survey are helpful in planning future land use patterns.

Large parts of the survey area are dominated by soils that are unfavorable for residential or urban development. Since many of these soils are in areas under military or Federal control, their use is restricted to grazing. Development for urban or residential use is not expected on some other soils in remote areas because of location and lack of water. Unfavorable soils in the basin parts of the survey area are in the Alamogordo-Gypsum land-Aztec, Holloman-Gypsum land-Yesum, Holloman-Reeves-Gypsum land, Lozier-Rock outcrop, and Nickel-Tencee general soil map units. Development on these steep soils is very costly, and slippage, poor compaction, and piping are very difficult to overcome. The soils and land types that are high in gypsum corrode underground utilities and concrete. Also, the gypsum dissolves in water, causing piping or sloughing under foundations.

In large areas in the basin part of the survey area are soils that can be developed for urban or residential use at lower cost than the restrictive soils discussed in the previous paragraph. These include those parts of the Tome-Mimbres and Prelo-Tome-Largo general soil map units that are not on flood plains. Structures in overflow areas and on flood plains are damaged by local flooding each year. Where diversions are used to protect individual pieces of land without an overall drainage system, the diverted water flows onto formerly unflooded areas, causing damage there. The less sloping parts of the Nickel-Tencee and Alamogordo-Gypsum land-Aztec map units can be developed, but care must be taken to avoid the Gypsum land. The excellent potential for farming of the Prelo, Tome, Mimbres, and Largo soils should also be considered in broad land use planning.

Large areas of certain soils have good potential for farming. These are the Prelo, Tome, Mimbres, and Largo soils, which have no severe limitations other than the hazards of wind and water erosion. When land is cleared, care should be taken to reduce wind erosion. Dona Ana, Berino, Ruidoso, and Shanta soils also have good potential for farming. Dona Ana and Berino soils have layers with a high lime content which could affect deep rooting. Shanta and Ruidoso soils occur only in one small area of the survey area but have no severe limitation for farming or nonfarm uses except flooding on some sites. Other soils, such as Armesa, Reyab, and Reakor soils, can be irrigated, but lack of available water and Federal control restrict this use and most other uses.

Most of the soils in the survey area have good to fair potential for grazing of domestic livestock. Some of the steeper parts of the Lozier-Rock outcrop, Deama-Tortugas-Rock outcrop, and Ector-Rock outcrop general soil map units are limited for grazing by steep slopes and large areas of bedrock and escarpments. The Bluepoint-Onite-Wink and Pintura-Dona Ana map units produce good stands of forage, but since they are on duned

uplands, extreme care is necessary to prevent severe wind erosion. Since large areas of these map units are on military land, only military use is allowed. The Philder-Armesa-Reyab map unit is in a slightly more moist area and produces good stands of vegetation for grazing. Much of this area is under military control but is open to grazing under a permit system. Wind erosion is a problem, but because of controls imposed on the land and proper management, little or no erosion occurs. Extreme care is needed to prevent wind erosion. The Reakor-Tome-Tencee map unit is used mainly for grazing. Because of past misuse, large areas are dominated almost completely by creosotebush, but some areas still produce fair to good stands of forage. Alamogordo, Holloman, and Yesum soils contain large amounts of gypsum throughout. These soils produce fair stands of vegetation; but since they are fragile, they should not be used as heavily as other soils. They tend to deteriorate rapidly under heavy use and recover extremely slowly.

Most of the soils in the survey area have poor potential for woodland. The soils of the Deama-Tortugas-Rock outcrop general soil map unit and parts of the Ector-Rock outcrop map unit support oneseed juniper and pinyon pine. The main use of the trees is firewood and fence posts. In some steeper and higher areas, there is marginal, but very inextensive, production of ponderosa pine.

Windbreaks are needed in the basin. Most soils except those shallow to bedrock or high in gypsum will support trees. Many species of trees and shrubs can be grown if irrigation water is available to establish and maintain them.

Many soils in the survey area have good to fair potential for recreation. Nearly level soils that have good potential for urban or residential development or farming are also suitable for such recreational uses as baseball diamonds, football fields, tennis courts, and play areas. Campsites are also important in the survey area. Overnight parking areas and roadside camping areas can be located on most of the soils in the basin. Soil blowing and dustiness are a problem. Onsite investigation is necessary in planning specific recreational enterprises. Campsites can also be located on the more gently sloping areas of the Deama-Tortugas-Rock outcrop, Ector-Rock outcrop, and Lozier-Rock outcrop general soil map units. These soils are shallow to bedrock, but because of their aesthetic value they could be used for campsites. These areas also offer excellent potential for extensive recreational use. Nature trails and nature study areas could be established in the steeper areas. Many types of habitat can be seen in a relatively short distance.

Soil maps for detailed planning

The map units shown on the detailed soil maps at the back of this publication represent the kinds of soil in the survey area. They are described in this section. The descriptions together with the soil maps can be useful in determining the potential of a soil and in managing it for food and fiber production; in planning land use and developing soil resources; and in enhancing, protecting, and preserving the environment. More information for each map unit, or soil, is given in the section "Use and management of the soils."

Preceding the name of each map unit is the symbol that identifies the soil on the detailed soil maps. Each soil description includes general facts about the soil and a brief description of the soil profile. In each description, the principal hazards and limitations are indicated, and the management concerns and practices needed are discussed.

The map units on the detailed soil maps represent an area on the landscape made up mostly of the soil or soils for which the unit is named.

Soils that have profiles that are almost alike make up a *soil series*. Except for allowable differences in texture of the surface layer or of the underlying substratum, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement in the profile. A soil series commonly is named for a town or geographic feature near the place where a soil of that series was first observed and mapped.

Soils of one series can differ in texture of the surface layer or in the underlying substratum and in slope, erosion, stoniness, salinity, wetness, or other characteristics that affect their use. On the basis of such differences, a soil series is divided into phases. The name of a *soil phase* commonly indicates a feature that affects use or management. For example, Prelo silt loam, 0 to 1 percent slopes, is one of several phases within the Prelo series.

Some map units are made up of two or more dominant kinds of soil. Such map units are called soil complexes and soil associations.

A *soil complex* consists of areas of two or more soils that are so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area includes some of each of the two or more dominant soils, and the pattern and proportion are somewhat similar in all areas. Largo-Ogral complex, 1 to 3 percent slopes, is an example.

A *soil association* is made up of soils that are geographically associated and are shown as one unit on the map because it is not practical to separate them. A soil association has considerable regularity in geographic pattern and in the kinds of soil that are a part of it. The extent of the soils can differ appreciably from one delineation to another; nevertheless, interpretations can be made for use and management of the soils. Dona Ana-Berino association, gently sloping, is an example.

Most map units include small, scattered areas of soils other than those that appear in the name of the map unit. Some of these soils have properties that differ sub-

stantially from those of the dominant soil or soils and thus could significantly affect use and management of the map unit. These soils are described in the description of each map unit. Some of the more unusual or strongly contrasting soils that are included are identified by a special symbol on the soil map.

Most mapped areas include places that have little or no soil material and support little or no vegetation. Such places are called *miscellaneous areas*; they are delineated on the soil map and given descriptive names. Badland is an example. Some of these areas are too small to be delineated and are identified by a special symbol on the soil map.

As explained in "How this survey was made," there are two detailed soil maps in the back of this publication—a low detail map and a high detail map (fig. 1). Because of the difference in detail of mapping, each soil map has a distinctive set of map units. The units for each are described on the following pages.

Descriptions of the low detail map units

The low detail soil map covers the entire Otero Area. In the low detail survey, the soils were examined at wide intervals and the map units are broadly defined. Most of the units on the low detail map are made up of two or more kinds of soils and are either associations or complexes. Some units, however, are made up mostly of only one soil. The kind of map unit depends on what kinds of soil occur and their pattern and extent. The low detail map units commonly include scattered areas of other soils less than 40 acres in size. The units on the low detail map are suitable primarily for planning use of generally large tracts of land, as for livestock grazing or wildlife habitat.

The acreage and proportionate extent of each low detail map unit are given in table 3, and additional information on properties, limitations, capabilities, and potentials for many soil uses is given for each kind of soil in other tables in this survey. (See "Summary of tables.") Many of the terms used in describing soils are defined in the Glossary.

AEC—Alamogordo-Gypsum land complex, 0 to 5 percent slopes. This complex consists of relatively small areas of deep, well drained Alamogordo soil and areas of exposed gypsum. These areas are so intermingled that they could not be separated on the low detail map. The landscape is mainly broad, dissected pediment toe slopes and filled valleys. The soil formed in highly gypsiferous alluvium and eolian deposits. Areas are broad and irregularly shaped and are 1,000 to more than 2,000 acres in size. Individual areas of each part are 10 to 30 acres in size.

The Alamogordo soil makes up about 50 percent of each mapped area. Typically, a desert pavement about 1/2 inch thick is on the surface. The surface layer is light brown very fine sandy loam about 7 inches thick. The upper 8 inches of the substratum is pinkish white very fine sandy loam that is very high in gypsum. Below that, the substratum is light brown very fine sandy loam to a depth of more than 60 inches. The amount of gypsum decreases with depth.

Permeability of this soil is moderately rapid, and available water capacity is low. In one area in the extreme northern part of the survey area near the base of the Godfrey Hills, the soil has a thick dark surface layer and more than 1 percent organic matter above a depth of 4 inches.

Gypsum land makes up about 30 percent of each mapped area. It is hard or soft exposed gypsum. In some areas the gypsum is covered by about 1 inch of eolian very fine sand. A desert pavement is commonly on the surface. The gypsum is 18 to more than 30 inches thick. Some parts of the exposed gypsum is eroded Alamogordo soils.

Included with this complex in mapping are small areas of Tome and Aztec soils and riverwash. Tome soils are primarily on valley fills. Aztec soils are primarily on steeper side slopes of pediments. Riverwash is on bottom land in drainageways. These soils make up about 20 percent of this complex.

This complex has low to moderate potential for grazing. In many years, plant production is barely adequate for small animals and micro-organisms. The soils are very fragile and cannot withstand intensive surface disturbance such as trampling by livestock. This complex should be used for occasional grazing when production is good rather than as a regular part of livestock operations. Grazing management should maintain or improve the plant cover, let litter accumulate, and prevent accelerated erosion on the Alamogordo soil.

Grazing should be managed to increase the production and reproduction of the dominant warm-season grasses, such as black grama, alkali sacaton, and gyp grama on the Alamogordo part and tobosa, bush muhly, and Arizona cottontop on the deeper soils. Periodically deferring grazing during the summer growing season, June through September, improves vigor and reproduction. Tobosa, which is dominant on the included deeper soils and the thicker-surface Alamogordo soil, should be grazed by cattle in July and August, when it is geen and growing. Range can be improved by scheduling more rest than use in the grazing system and by altering the seasons of use from year to year. Continuous year-long grazing results in a plant community dominated by low value plants, such as creosotebush, mesquite, yucca, condalia, cacti, ocotillo, and fluffgrass. Range in this condition is unsuitable for grazing and is subject to accelerated soil erosion.

This complex is not suitable for mechanical range seeding, because there is small probability of enough precipitation for the establishment of seedlings. Mechanical brush management is not suitable because of the

difficulty of establishing new vegetation on disturbed ground. Underground plastic pipelines and steel drinking troughs are the best method of distributing livestock water uniformly. Earthen ponds, embankments, and steel pipelines are not feasible because of the solubility and corrosivity of the gypsiferous substratum. Fencing is possible on this complex, but fencing the areas into small grazing units for intensive management has not been economical because forage production and the return from grazing are low.

The potential for wildlife habitat is low. The soils produce native plants that provide food and cover for scaled and Gambel quail, mourning and white-winged dove, pronghorn antelope, and mule deer.

The potential for urban use and farming is low, primarily because of the gypsum content of the soils. The low strength, solubility of gypsum, and corrosivity limit urban use. The severe erosion hazard, salinity, and thin surface layer over gypsum limit farming and are very difficult to overcome.

AGE—Alamogordo-Gypsum land-Aztec complex, 15 to 50 percent slopes. This complex consists of areas of deep, well drained soils and areas of exposed gypsum. These areas are so intermingled that they could not be separated on the low detail map. The landscape is mainly severely dissected, partially truncated side slopes of pediments. Areas are elongated and are 500 to 2,000 acres in size. Areas of each part are 5 to 30 acres in size.

The Alamogordo soil makes up about 45 percent of each mapped area. Typically, a desert pavement 1 inch thick is on the surface. The surface layer is light brown fine sandy loam about 6 inches thick. The upper 20 inches of the substratum is pinkish white very fine sandy loam that is very high in gypsum. Below this, the substratum is brown fine sandy loam to a depth of more than 60 inches and has less gypsum than the upper part of the substratum. In about 5 percent of the area this soil does not have the desert pavement.

This soil is calcareous throughout, but in places it is noncalcareous in the lower part of the substratum. It is moderately alkaline and slightly saline. Permeability is moderately rapid, and available water capacity is low.

Gypsum land makes up about 20 percent of each mapped area. It consists of hard and soft exposed gypsum generally more than 30 inches thick. Some of the exposed gypsum is eroded Alamogordo soil.

The Aztec soil makes up about 20 percent of each mapped area. Typically, the surface layer is light gray sandy loam about 5 inches thick. The upper 11 inches of the substratum is white gravelly sandy loam. The next 15 inches is light gray and very pale brown very gravelly sandy loam that is high in lime and gypsum. Below this, the substratum is very pale brown very gravelly loamy sand and extremely gravelly loamy sand to a depth of more than 60 inches. Large crystals of gypsum are in this part of the substratum; these become fewer with depth.

This soil is calcareous throughout and is moderately alkaline. Permeability is moderately rapid below a depth of 16 inches, and available water capacity is very low.

Included with this complex in mapping are small areas of Lozier and Tome soils, Rock outcrop, and riverwash. Tome soils are in depressions adjacent to the wider drainageways. Rock outcrop is on steep side slopes. Lozier soils are near limestone hills. Riverwash is in the bottom and at the head of the many entrenched drainageways. These inclusions make up about 15 percent of this map unit.

The complex has low potential for grazing. Because of the steep slopes, sparse vegetation, and gypsum in the substratum, the soils are fragile and erode easily under intensive use by livestock. This complex should be used for occasional grazing rather than as a regular part of livestock operations. Grazing management should maintain or improve the plant cover, accumulate litter, and prevent accelerated soil erosion.

Grazing should be managed to increase production and reproduction of warm-season grasses such as black grama, bush muhly, alkali sacaton, gyp grama, and tobosa. Periodically deferring grazing during the summer growing season, June through September, improves vigor and reproduction. Scheduling more rest than use in the grazing system and changing the grazing season from year to year improves the range. Continuous yearlong grazing results in a plant community dominated by creosotebush, mesquite, yucca, condalia, ocotillo, cacti, and fluffgrass. Range in this condition is unsuitable for grazing and is subject to accelerated soil erosion.

This complex is not suitable for mechanical range seeding, because of the steepness of slopes and the small probability that the area will receive enough precipitation for the establishment of seedlings. Intensive grazing management that includes brush management, fencing, and livestock watering facilities has not proven economical because of low production of forage.

The potential of this complex for wildlife habitat is low. This complex produces food and cover for scaled and Gambel quail, mourning and white-winged dove, pronghorn antelope, mule deer, and desert bighorn.

The potential for urban use, farming, and recreation is low. The steep slopes, shallow depth to gypsum, gravelly surface, and high content of gypsum in the substratum are difficult to overcome.

AMC—Armesa very fine sandy loam, 0 to 5 percent slopes. This deep, well drained, calcareous soil is on nearly level to gently sloping uplands. The landscape is mainly broad, partially dissected toe slopes of pediments and low rolling hills. The soils formed in medium textured alluvium and eolian sediment. The mapped areas are broad and somewhat elongated and are 2,000 to 6,000 acres in size.

Typically, the surface layer is brown very fine sandy loam about 3 inches thick. The subsoil is brown sandy clay loam about 11 inches thick. The upper 17 inches of the substratum is white silty clay loam that is very high in carbonates. The lower part of the substratum is very pale brown gravelly silty clay loam and pink gravelly sandy clay loam to a depth of more than 60 inches. Lenses of strongly cemented material are throughout the upper part of the substratum.

Included with this soil in mapping are small areas of Philder soils on the uplands and side slopes, Reyab soils in narrow drainageways, and Lozier soils near Rock outcrop on the fringe of the mapped area. These soils make up 10 to 20 percent of mapped areas. Individual areas of these soils are generally smaller than 10 acres.

This soil is calcareous and moderately alkaline. Permeability is moderate, and available water capacity is high.

Most areas of this soil are on military land and are used either for missile impact sites or for grazing.

This soil has high potential for grazing in most years. Grazing management should maintain the plant cover, let litter accumulate, and prevent accelerated soil erosion.

Grazing should be managed to maintain the basic cover of black grama, which is dominant, and blue grama, sideoats grama, vine-mesquite, palatable forbs, and browse. Periodically deferring grazing during the growing season, July through September, improves vigor and reproduction of the grasses. Deferring grazing in spring is beneficial to forbs, and fall and winter rest from grazing encourages vigor and reproduction of shrubs such as winterfat and fourwing saltbush. Varying the season of grazing and rest from year to year helps to maintain a balanced plant community that provides quality forage all year.

Range seeding is only marginally successful on this soil. Reliable precipitation records are not available. The Armesa soil is suitable for fencing, chemical and mechanical brush management, pipelines, and livestock watering facilities.

This map unit has moderate potential for wildlife habitat. This soil produces native plants that provide food and cover for scaled quail, mourning and white-winged dove, pronghorn antelope, and mule deer.

This unit has no severe limitations for any use, but because of location, very little farming or urban use is expected. The erosion potential is high because of the texture of the surface layer. Care must be taken when any use disturbs the plant cover.

AZF—Aztec-Rock outcrop-Lozier complex, 20 to 65 percent slopes. This complex consists of areas of deep and shallow, well drained soils and limestone outcrop. These areas are so intermingled that they could not be separated on the low detail map. The landscape is steep, limestone-controlled side slopes, hill crests, and ridges on the west face of mountain escarpments. Mapped areas are 1,000 to more than 2,500 acres in size. Individual areas of each part are 2 to 20 acres in size.

The deep Aztec gravelly loam makes up about 35 percent of each mapped area. Typically, the surface layer is light brown gravelly loam about 4 inches thick. The upper 12 inches of the substratum is brown gravelly loam. The content of gypsum segregations increases in the lower part. The next 10 inches is very pale brown gravelly sandy loam that is more than 40 percent gypsum. Below that, the substratum is very pale brown very gravelly sandy loam to a depth of more than 60 inches.

This soil is calcareous throughout and moderately alkaline. Permeability is moderately rapid, and available water capacity is very low. The soil has been severely eroded in many areas. Narrow, V-shaped drainageways are common.

Rock outcrop makes up about 30 percent of each mapped area. The outcrop consists of limestone bedrock in the form of catstep escarpments, or shelves, and large frontal escarpment caps. Outcrops of variegated soft siltstone and shale are common in some parts of most mapped areas.

Runoff from this part of the complex is rapid, and the water runs onto the adjacent soils. Since this accelerates erosion on the soils, much of the soils has been eroded down to bedrock.

The shallow Lozier gravelly loam makes up about 25 percent of each mapped area. Typically, the surface layer is light brownish gray and pale brown gravelly loam about 7 inches thick. The substratum is white extremely gravelly loam about 8 inches thick. It is very high in lime. Limestone bedrock is at a depth of 15 inches.

This soil is strongly calcareous and moderately alkaline. Permeability is moderate, and available water capacity is very low. The soil is severely eroded in some areas; the soil is only a thin mantle over bedrock. Stream dissection is common.

Included with this complex in mapping are small areas of exposed gypsum interbedded with limestone, coarse textured alluvial soils and riverwash in drainageways, and Ector soils on some higher north-facing side slopes. Some areas of coarse-loamy Torriorthents are along lower lying drainageways. Some areas of very gravelly soils that have limestone or shale at a depth of 20 to 40 inches are also included. These inclusions make up 10 percent of this complex.

This complex has low potential for grazing. Because of the steep slopes and gypsiferous soils, this complex is fragile and erodes easily under intensive use by livestock. This complex should be used for occasional grazing rather than as a regular part of livestock operations. Grazing management should improve or maintain the plant cover, let litter accumulate, and prevent accelerated erosion.

Grazing should be managed to increase the production and reproduction of the desirable grasses, such as black grama, bush muhly, alkali sacaton, and plains bristlegrass, as well as a variety of palatable forbs and shrubs on the Aztec and Lozier soils. Periodically deferring grazing during the summer growing season, July through September, improves the vigor and reproduction of these warm-season grasses. Spring rest from grazing encourages the forbs, and fall and winter rest is beneficial to shrubs. Changing the seasons of grazing and rest from year to year maintains a variety of vegetation that provides high quality forage all year. Continuous year-long grazing results in a plant community dominated by catclaw, creosotebush, cacti, condalia, coldenia, and fluffgrass. Range in this condition is unsuitable for grazing and is subject to accelerated soil erosion.

This complex is not suitable for mechanical range seeding because of slope, Rock outcrop, and shallow soil depth. Intensive grazing management that includes fencing, underground pipelines, watering facilities, and earthen ponds and dams is either unfeasible, uneconomical, or difficult because of steep slopes, Rock outcrop, and shallow depth. A few suitable pond sites are on included deeper soils in the lower parts of drainageways. Ponds generally fill with sediment quickly. The scarcity of water makes control of livestock distribution and forage use difficult. Because of the great variety of vegetation on this complex, the forage can be most efficiently used by combinations of sheep, goats, and cattle.

The potential for wildlife habitat is low to moderate. These soils produce native plants that provide food and cover for scaled and Gambel quail, mourning and white-winged dove, mule deer, and desert bighorn.

This complex has essentially no potential for urban use or farming due to the steep slopes, shallow soil depth, and large amount of Rock outcrop.

BAF—Badland. Badland is gently rolling to very steep, highly dissected, nearly barren land consisting of areas of Rock outcrop and thin soils. These soils formed primarily in material weathered from interbedded shale, siltstone, arkosic sandstone, and cobble conglomerate of the Abo Formation and calcareous shale, thin argillaceous limestone, quartz sandstone, and limestone conglomerate of the Bursum Formation. Badland occupies one large area of about 21,000 acres. Individual areas of each part are 0.5 to 40 acres in size.

Badland makes up about 70 percent of the mapped area. Shale, siltstone, and mudstone outcrops occur as weathered materials interbedded on side slopes between outcrops of sandstone and limestone. These outcrops form rock ledges and escarpments throughout this complex. Rounded and semirounded gravel, flagstones, and cobbles cover much of the surface and form talus slopes of small slides in places. Exposed gypsum interbedded with outcrops of limestone and shale dominates the lower parts of side slopes and southern exposures of most hills in the unit (fig. 6).

Runoff is rapid on most areas of Badland. Severe sheet and gully erosion takes place even during small rain showers.

Included in mapping are small intermingled areas of Lozier and Holloman soils. The Lozier soils are over limestone, and the Holloman soils are over bedded gypsum. Deep, gravelly loam and sandy loam soils are contiguous to drainageways, and narrow bands of riverwash are common throughout the area. The soils are severely eroded and are only a thin mantle over the sandstone bedrock. Available water capacity is very low, but in some areas runon water from the surrounding Rock outcrop supplies at least the minimal moisture needed by plants. These inclusions make up about 30 percent of this map unit.

This unit has low potential for recreation. Nature trails for geologic study, environmental analysis, and wildlife study can be established, but such trails must be developed carefully because the soils in this map unit are highly erodible.

The potential for grazing is very low. Because of fragility of the surface, steep slopes, and sparse plant cover, managing Badland for grazing is not feasible. A sparse but diverse variety of plants grows on the included soils and is used by wildlife. Fencing off these areas would help the grazing management of adjacent productive soils and enhance the value of this unit for wildlife habitat.

The potential for wildlife habitat is low. This area produces native plants that provide food and cover for scaled and Gambel quail, mourning and white-winged dove, mule deer, and desert bighorn.

The potential for urban use and farming is very low because of shallow soil depth, Rock outcrop, and steep slopes. Housing sites are few and are confined to some narrow ridgetops. Further development is limited by the possibility of contaminating streams that provide irrigation water and domestic water for Tularosa.

BOA—Bluepoint-Onite-Wink association, nearly level. This association consists of areas of well drained and somewhat excessively drained soils. These soils occur in a regular and repeating pattern on relic foot slopes that have been dissected by many small drainageways and in small areas on the basin floor. The Bluepoint soils are on parts of the coppice dunes scattered over the unit. The Onite soils are in the depressional areas adjacent to the dunes. The Wink soils are in the depressional areas between the Bluepoint and Onite soils. These soils formed in calcareous, coarse textured eolian and alluvial sediment, and they have received recent deposits of eolian sediment. The mapped areas are irregularly shaped and are 400 to 4,000 acres in size. Individual areas of each soil are less than 1 acre to 40 acres in size.

The somewhat excessively drained Bluepoint soils make up about 35 percent of the association. Typically, the surface layer is light reddish brown loamy fine sand about 8 inches thick. The upper 10 inches of the substratum is light reddish brown loamy fine sand. Below this, the substratum is light brown loamy fine sand and loamy sand to a depth of more than 60 inches.

These soils are mildly alkaline to moderately alkaline and slightly calcareous to strongly calcareous. In places the Bluepoint soils are noncalcareous in the upper 5 inches. Permeability is rapid, and available water capacity is low.

The well drained Onite soils make up about 25 percent of the association. Typically, the surface layer is brown loamy fine sand about 10 inches thick. The subsoil is brown sandy loam about 20 inches thick. The substratum is brown and light brown sandy loam to a depth of more than 60 inches.

These soils are mildly alkaline to moderately alkaline and are noncalcareous in the surface layer and strongly calcareous throughout the rest of the profile. Permeability is moderately rapid, and available water capacity is low.

The well drained Wink soils make up about 20 percent of the association. Typically, the surface layer is light brown loamy fine sand and sandy loam about 8 inches thick. The subsoil is brown sandy loam about 10 inches thick. The substratum is pink and light brown sandy loam to a depth of more than 60 inches.

These soils are moderately alkaline throughout and slightly calcareous to strongly calcareous. Permeability is moderately rapid, and available water capacity is low.

Included with these soils in mapping are a few areas of Pintura soils on coppice dunes. Also included are small areas of Berino soils in the older depressions and areas of soils that are shallow over hard caliche near the hills that surround some mapped areas. Holloman soils are in small pockets on the northern fringes of mapped areas. These soils make up about 20 percent of the association.

The potential for grazing is moderate on this association. Grazing management should improve or maintain the plant cover, let litter accumulate, and prevent accelerated soil erosion.

Grazing should be managed to increase production and reproduction of the desirable warm-season grasses such as black grama, bush muhly, plains bristlegrass, giant dropseed, and mesa dropseed; forbs such as croton, globemallow, zinnia, and blanketflower; and shrubs such as fourwing saltbush and Mormon-tea. Periodically, deferring grazing during the summer growing season, June through September, improves the vigor and reproduction of the grasses. Spring rest from grazing encourages forbs, and fall and winter rest is beneficial to shrubs. The previous year's growth should be left standing during the windy season, February through May, to prevent excessive wind erosion. Varying the seasons of grazing and rest from year to year maintains a balanced plant community that provides high quality forage all year. Continuous year-long grazing results in a plant community dominated by mesquite, yucca, sand sagebrush, broom snakeweed, threeawn, and annual weeds. Range in this condition is of little value for grazing and is subject to accelerated wind erosion.

Mechanical range seeding is not feasible on this association, because of the small probability that the area will receive enough precipitation for the establishment of seedlings. Chemical brush management is preferable to mechanical because of the difficulty of establishing new vegetation on disturbed ground. The spread of yucca can be checked by letting cows graze the area while yucca is in flower in May and June. Intensive grazing management that includes fencing, underground pipelines, and livestock watering facilities is feasible throughout this association. Careful onsite investigation is needed to properly place earthen ponds and dams. The forage and browse produced on these soils are generally coarse and are most efficiently used by mature cows.

Because most of this association is in military-controlled areas, use of these soils is restricted. The limitations on roads and other facilities are few, but wind erosion is a problem. During construction, the disturbed areas should be seeded, mulched, and watered until a plant cover is established. Windbreaks should be established as soon as possible after disturbing a site. Lawns and shoulders of roads should be mulched and irrigated until grass is established. Septic tank absorption fields work very well.

The potential for wildlife habitat is moderate. These soils produce native plants that provide food and cover for scaled and Gambel quail, mourning and white-winged dove, pronghorn antelope, mule deer, and desert bighorn.

These soils are unsuited to farming. Wind erosion is a severe problem and is very difficult to control if row crops or small grains are grown.

BRF—Borrego cobbly loam, 15 to 40 percent slopes. This shallow, well drained soil is on moderately steep to steep ridges and hills. Elevation ranges from 6,500 to 7,500 feet. This soil formed in material weathered from sandstone, limestone, and dolomite.

Typically, the surface layer is light brownish gray cobbly loam about 5 inches thick. The subsoil is very pale brown gravelly clay loam and reddish yellow gravelly clay about 11 inches thick. Hard sandstone bedrock is at a depth of 16 inches.

Included with this soil in mapping are small areas of Tortugas gravelly loam that has slopes of 15 to 40 percent.

Effective rooting depth is less than 20 inches. Some roots penetrate into rock fractures. Permeability is very slow, and available water capacity is very low. The erosion hazard is severe.

The natural vegetation on this soil is ponderosa pine with scattered pinyon pine and alligator juniper and an understory of cool-season grasses and forbs. This soil is at the highest elevations on the Guadalupe Mountains.

Management is limited by shallow soil depth. The soil should be managed for ponderosa pine. Site indexes are low and the trees are crooked and limby. If the canopy is opened up during cutting for timber or firewood, pinyon pine and alligator juniper rapidly encroach. Grazing should be managed to benefit cool-season grasses and forbs. This soil provides some habitat for mule deer.

CFA—Crowflats silt loam, 0 to 2 percent slopes. This deep, well drained soil is on level to nearly level bottom lands. The landscape is mainly broad alluvial drainageways and alluvial fans at the mouth of canyons. The soil formed in mixed alluvial sediment and a very small amount of eolian material. The mapped areas are elongated, wide to narrow, or fan shaped and are 250 to 3,000 acres in size.

Typically, the surface layer is pale brown silt loam about 4 inches thick. The substratum is stratified pale brown and brown silt loam and loam to a depth of more than 60 inches.

Included with this soil in mapping are small areas of Tome soils and a soil that is similar to this Crowflats soil but that is darker colored and has more organic matter. These soils are interspersed along the edges of some mapped areas. A few isolated areas of Reeves and Holloman soils occur in the southern part of the survey area. The included soils make up 10 to 20 percent of any mapped area. Individual areas of these soils are generally smaller than 10 acres.

This soil is strongly calcareous throughout and moderately alkaline. Permeability is moderate, and available water capacity is high. The soil is about 3 percent organic matter in the surface layer and is high in natural fertility.

The potential for grazing is high. The Crowflats soil is enough higher in production of natural vegetation than adjoining and associated soils for special management to be worthwhile. Grazing management should maintain the plant cover, let litter accumulate, and prevent accelerated soil erosion.

Grazing should be managed to increase the production and availability of the more palatable, high producing grasses such as giant sacaton, alkali sacaton, cane bluestem, Arizona cottontop, and twoflower trichloris. Most forage is produced by giant sacaton. Occasional planned burning helps to remove coarse unused stalks and increases the palatability and accessibility of these coarse grasses. Laws, regulations, and precautions must be followed when burning. The feasibility of burning depends on locating areas large enough to fence and manage intensively. Where the soils are also managed for wildlife habitat, the effects of burning on nesting and resting cover should be carefully evaluated. Continuous year-long grazing results in a plant community dominated by American tarbush, cacti, mesquite, catclaw, and other plants of little value for grazing. These plants furnish less forage and shorten the period that nutritious forage can be grazed. Range in this condition is subject to accelerated soil erosion and increased sediment production.

This soil is well suited to grazing management that includes fencing, underground pipelines, livestock watering facilities, earthen dams, and ponds. Both chemical and mechanical brush management are feasible, as is periodic burning. Mechanical range seeding can either follow normal site preparation or be combined with root plowing. Adapted species for seeding include improved varieties of giant sacaton, alkali sacaton, blue panicgrass, switchgrass, vine-mesquite, plains bristlegrass, and fourwing saltbush.

The potential for wildlife habitat is high. This soil produces native plants that provide food and cover for scaled and Gambel quail, mourning and white-winged dove, pronghorn antelope, and mule deer.

The potential for irrigated crops and pasture is high. Diversion dikes are necessary in most areas, but they should be used only for crops or pasture. On native range, they would reduce production.

Potential for urban use is low because of location and flooding. Dams and diversions would be necessary.

DEB—Deama gravelly loam, 0 to 5 percent slopes. This shallow, well drained soil is on gently rolling ridges and mesa tops. Elevation ranges from 4,500 to 6,500 feet. This soil formed in material weathered from limestone.

Typically, the surface layer is brown gravelly loam about 4 inches thick. The substratum is dark grayish brown and dark brown very gravelly clay loam about 11 inches thick. Partially fractured limestone bedrock is at a depth of 15 inches.

Included with this soil in mapping are small areas of Dye, Encierro, and Tortugas soils.

Effective rooting depth is 20 inches or less. Some roots penetrate into rock fractures. Permeability is moderate, and available water capacity is very low. The erosion hazard is moderate.

The natural vegetation on this soil is juniper-pinyon woodland with some scattered live oak and an understory of grasses and forbs. These soils are at the lowest elevations on the Guadalupe Mountains that are wooded. Oneseed juniper is the dominant tree in this area.

Management is limited by shallow soil depth and low rainfall. This soil is used for grazing and firewood production. The plant cover density should be maintained to reduce the moderate erosion hazard. Grazing should be managed to benefit cool-season grasses. Cutting pinyon pine for firewood should be light to prevent encroachment of juniper and oak, which will replace the pinyon pine. This soil also supplies some habitat for mule deer.

DEF—Deama gravelly loam, 5 to 30 percent slopes. This shallow, well drained, gently sloping to moderately steep soil is on low hills and ridges. Elevation ranges from 4,500 to 6,500 feet. This soil formed in residuum from limestone.

Typically, the surface layer is very dark grayish brown gravelly loam about 4 inches thick. The substratum is dark grayish brown and dark brown very gravelly clay loam about 11 inches thick. Partially fractured limestone bedrock is at a depth of 15 inches.

Included with this soil in mapping are small areas of Rock outcrop and Dye, Tortugas, and Encierro soils.

Effective rooting depth is 20 inches or less. Some roots penetrate into rock fractures. Permeability is moderate, and available water capacity is very low. The erosion hazard is severe.

The natural vegetation on this soil is juniper-pinyon woodland with scattered live oak and an understory of grasses and forbs. Oneseed juniper is the dominant tree in this area because of low rainfall and elevation.

Management is limited by shallow soil depth and low rainfall. This soil is used for grazing and firewood production. The plant cover density should be maintained to reduce the severe erosion hazard. Grazing should be managed to benefit cool-season grasses. Cutting of pinyon pine for firewood should be light to prevent encroachment of juniper and oak. This soil provides some habitat for mule deer.

DRF—Deama-Rock outcrop complex, 20 to 50 percent slopes. This complex consists of relatively small areas of shallow, well drained Deama soil and Rock outcrop. These areas are so intermingled that they could not be separated on the low detail map. The landscape is mainly low limestone hills, consisting of steep side slopes, mesas, plateaus, and many rock-controlled drainageways. Mapped areas are broad and are 1,000 to 1,500 acres or larger in size. Individual areas of each part are 10 to 40 acres in size.

Deama very gravelly loam makes up about 70 percent of each mapped area. Typically, the surface layer is brown very gravelly loam about 4 inches thick. The substratum is dark grayish brown and brown very gravelly clay loam about 10 inches thick. This layer is very high in lime. Limestone bedrock is at a depth of about 14 inches. There are some fractures on the surface of the limestone, but they are not continuous.

This soil is strongly calcareous and moderately alkaline. Permeability is moderate, and available water capacity is very low.

Rock outcrop makes up about 15 percent of each mapped area. It typically occurs as small escarpments, escarpment caps, and large angular boulders embedded in the soil. Surface weathering and pitting on rock faces are common.

Included with this complex in mapping are small areas of intermingled Ector, Pena, Kerrick, and Cale soils. The Ector soils are mainly lower in elevation than the major soils. The Pena and Cale soils are mainly in depressional areas in less sloping parts of the complex. Kerrick soils are on hilltops and side slopes in some areas. These soils make up about 15 percent of this complex.

This complex has moderate potential for grazing. Grazing management should improve or maintain the plant cover, let litter accumulate, and prevent accelerated soil erosion.

Grazing should be managed to increase the production and reproduction of the desirable grasses such as little bluestem, bullgrass, plains lovegrass, and green sprangletop as well as a variety of palatable forbs and shrubs. Periodically deferring grazing during the summer growing season, July through September, improves the vigor and reproduction of the warm-season grasses such as black grama, sideoats grama, and little bluestem. Spring rest encourages growth of forbs and reproduction of cool-season grasses such as New Mexico feathergrass, deergrass, bullgrass, and pinyon ricegrass. Fall and winter rest is beneficial to shrubs. Varying the seasons of grazing and rest from year to year maintains a balanced plant community that provides quality forage all year. Continuous year-long grazing results in a plant community dominated by oneseed juniper, pinyon pine, algerita, cacti, broom snakeweed, and threeawn. Range in this condition is of little value for grazing and is commonly subject to accelerated soil erosion.

Grazing management that includes fencing, underground pipelines, livestock watering facilities, mechanical range seeding, earthen dams, and ponds is not feasible because of the shallow depth to bedrock. Dams and ponds can be built on included deeper soils in depressions and drainageways. In places pipelines to drinking troughs can be routed through deeper soils in drainageways. Many wells in this area are very deep. The scarcity of drinking water limits the degree of control over forage use. Because of the great variety of vegetation on this complex, the forage can be most efficiently used by combinations of sheep, goats, and cattle.

The potential for wildlife habitat is low to moderate. This soil produces native plants that provide food and cover for scaled and harlequin quail, wild turkey, mountian lion, black bear, white-tailed deer, mule deer, elk, pronghorn antelope, and bighorn sheep.

The potential for other uses is relatively low because of shallow slope, soil depth, texture, and other characteristics of the soil. Recreation potential is moderate to high, but recreational development should not change the local environment.

DRG—Deama-Rock outcrop complex, 50 to 150 percent slopes. This complex consists of areas of very steep to extremely steep, shallow, well drained Deama soil and Rock outcrop on canyon sides. Elevation ranges from 4,500 to 5,500 feet. The soils formed in residuum derived from limestone.

Deama cobbly loam makes up about 65 percent of this complex. Typically, the surface layer is brown cobbly loam about 4 inches thick. The substratum is dark grayish brown and dark brown very gravelly clay loam about 10 inches thick. Fractured limestone bedrock is at a depth of 14 inches.

The effective rooting depth of this soil is less than 20 inches. Permeability is moderate, and available water capacity is very low. Surface runoff is high, and the erosion hazard is severe.

Rock outcrop makes up 25 percent of this complex. The outcrop is fractured limestone and dolomite. Some soil material is in the fractures.

Included with this complex in mapping are areas of Tortugas, Dye, and Encierro soils. These soils make up about 10 percent of this map unit.

Management is limited by slope and shallow soil depth. The natural vegetation is juniper-pinyon woodland with scattered live oak and an understory of grasses, forbs, and shrubs. The severe erosion hazard precludes management. These soils provide habitat for mule deer.

DSF—Deama-Rock outcrop-Holloman Variant complex, 15 to 65 percent slopes. This complex consists of small areas of shallow, well drained soils and Rock outcrop. These areas are so intermingled that they could not be separated on the low detail map. The complex is on limestone mountainsides and ridges along the western front of the Sacramento Mountains. Mapped areas are irregularly shaped and are 1,000 to 4,000 acres in size. Individual areas of each part are 20 to 40 acres in size.

Deama very gravelly loam makes up about 40 percent of each mapped area. Typically, the surface layer is dark brown very gravelly loam about 4 inches thick. The substratum is dark grayish brown and dark brown very gravelly clay loam. Limestone bedrock is at a depth of 14 inches.

This soil is strongly calcareous and moderately alkaline. Permeability is moderate, and available water capacity is very low.

Rock outcrop makes up about 20 percent of each mapped area. It occurs on mountainsides and ridgetops. It is more extensive on the very steep and steep ridges than in other areas. Surface weathering is common.

The Holloman Variant soil makes up about 15 percent of each mapped area. Typically, the surface layer is dark brown gravelly loam about 12 inches thick. The next layer is very pale brown gypsum about 8 inches thick. Olive gray, partially weathered gypsiferous shale and sandstone is at a depth of 20 inches.

Permeability of this soil is moderate, and available water capacity is very low.

Included with this complex in mapping are small, intermingled areas of igneous outcrop and soils that are shallow to igneous bedrock. These areas are at the higher elevations of the map unit. Also included are areas of shale, sandstone, and siltstone outcrops on very steep southern exposures. Small areas of Pena soils occur on the lower footslopes adjacent to narrow valleys and broad gently sloping to moderately steep pediments that slope to the basin floor. Also included are areas of gravelly and cobbly riverwash, deep gravelly soils that are high in organic matter, and Shanta soils in the narrow drainageways that dissect the unit. These inclusions make up about 25 percent of the unit.

This complex has low potential for grazing. Grazing management should improve or maintain the plant cover, let litter accumulate, and prevent accelerated soil erosion. Because of the steep slopes and gypsiferous soils, this complex is fragile and erodes easily under intensive use. It should be used for occasional grazing rather than as a regular part of livestock operations.

Grazing should be managed to increase the production and reproduction of the desirable grasses, such as little bluestem, sideoats grama, black grama, New Mexico feathergrass, green needlegrass, and plains lovegrass, as well as a variety of palatable forbs and shrubs. Periodically deferring grazing during the summer growing season, July through September, improves the vigor and reproduction of the warm-season grasses such as sideoats grama and black grama. Spring rest encourages the growth of forbs and reproduction of the cool-season grasses such as New Mexico feathergrass. Fall and winter rest is beneficial to shrubs. Changing the seasons of grazing and rest from year to year maintains a variety of vegetation that provides high quality forage all year. Continuous year-long grazing results in a plant community dominated by oneseed juniper, cacti, broom snakeweed, and fluffgrass. Range in this condition is unsuitable for grazing and is subject to accelerated soil erosion.

Mechanical range seeding is not feasible because of slope, Rock outcrop, and shallow soil depth. Intensive grazing management that includes fencing, underground pipelines, watering facilities, earthen ponds, and dams is either unfeasible, uneconomical, or difficult because of steep slopes, Rock outcrop, and shallow soil depth. A few suitable pond sites are on included Shanta soils in the drainageways. Ponds generally fill with sediment quickly. The scarcity of water makes control of livestock distribution and forage use difficult. Because of the great variety of vegetation on this complex, the forage can be most efficiently used by combinations of sheep, goats, and cattle.

The slope, shallowness to rock, and Rock outcrop make this complex unsuitable for farming.

The potential for urban development is low because of many severe restrictions. The moderately steep to very steep slopes limit the potential for homesites and roads and streets. The amount of exposed bedrock and shallowness to bedrock in the Deama soil are difficult to overcome. The Holloman Variant soil has a large amount of gypsum above a depth of 20 inches. Special erosion

control practices are needed to minimize surface runoff and soil erosion. Special site or building designs are also needed because of slope. Noncorrodible materials should be used for underground utilities. Central sanitation facilities should be used rather than septic tanks. Laterally moving effluent could surface downslope where the soil is shallow or bedrock is exposed.

The potential for wildlife habitat is moderate on this complex. These soils produce native plants that provide food and cover for scaled and harlequin quail, wild turkey, mountain lion, black bear, white-tailed deer, mule deer, elk, pronghorn antelope, and bighorn sheep.

This complex has low potential for recreational facilities such as camp grounds and trails. The steep slope is the main limitation.

DTB—Dona Ana-Berino association, gently sloping. This association consists of areas of deep, well drained soils. These soils occur in a regular and repeating pattern on foot slopes of a relic pediment. The upper part of the foot slope has been truncated, and the lower part is dissected by small drainageways. The Dona Ana and Berino soils are on the level to slightly concave positions. The Dona Ana soils are also on the more sloping parts. These soils formed in eolian material and medium textured alluvium high in carbonates. The mapped areas are 300 to more than 1,500 acres in size. Individual areas of each soil are 40 to 70 acres.

The Dona Ana soils make up about 40 percent of the association. Typically, the surface layer is reddish brown fine sandy loam about 3 inches thick. The subsoil is about 18 inches thick. It is reddish brown sandy clay loam that is high in carbonates. The upper 16 inches of the substratum is pinkish gray sandy clay loam that is very high in carbonates. This is the zone of maximum carbonate accumulation. Below this, the substratum is light reddish brown sandy loam to a depth of more than 60 inches. The amount of carbonates decreases with depth in the lower part of the substratum.

These soils are calcareous throughout and are moderately alkaline. Permeability is moderate, and available water capacity is high.

The Berino soils make up about 35 percent of this association. Typically, the surface layer is light reddish brown sandy loam about 3 inches thick. The subsoil is reddish brown and light reddish brown sandy clay loam about 33 inches thick. The substratum to a depth of more than 60 inches is pink sandy clay loam that is very high in carbonates.

These soils are leached of carbonates to a depth of about 27 inches and are strongly calcareous below. They are moderately alkaline. Permeability is moderate, and available water capacity is high.

Included in mapping are a few areas of Pintura, Bluepoint, Onite, Wink, and Nickel soils. The Pintura soils are on low coppice dunes. The Bluepoint soils are also on dunes and along narrow drainageways. The Onite and Wink soils are intermixed with the Berino soils. The Nickel soils are primarily along drainageways on the upper parts of fans on pediments. A few playa lakebeds are in one mapped area. These inclusions make up about 25 percent of this association.

This association has moderate potential for grazing. Grazing management should improve or maintain the plant cover, let litter accumulate, and prevent accelerated soil erosion.

Grazing should be managed to increase the production and reproduction of the more desirable warm-season grasses, such as black grama, bush muhly, and plains bristlegrass, and a variety of palatable forbs and shrubs, such as fourwing saltbush. Periodically deferring grazing during the summer growing season, June through September, improves the vigor and reproduction of these grasses. Spring rest from grazing encourages the forbs, and fall and winter rest is beneficial to shrubs.

Varying the seasons of grazing and rest from year to year maintains a balanced plant community that provides high quality forage all year. Continuous year-long grazing results in a plant community dominated by mesquite, creosotebush, American tarbush, yucca, threeawn, and burrograss. Range in this condition is of little value for grazing and is subject to accelerated soil erosion.

Mechanical range seeding is not feasible on these soils because of the small probability that the area will receive enough precipitation for the establishment of seedlings. Chemical brush management is preferable to mechanical because of the difficulty of establishing new vegetation on disturbed ground. The spread of yucca can be checked by letting cows graze while yucca is in flower in May and June. Intensive grazing management that includes fencing, underground pipelines, livestock watering facilities, and earthen dams and ponds is feasible on these soils.

Potential for wildlife habitat is low. These soils produce native plants that provide food and cover for scaled and Gambel quail, mourning and white-winged dove, and pronghorn antelope.

If irrigation water were available, the potential for irrigated farming would be high. The potential for urban development or recreation is moderate to high. The moderate shrink-swell potential moderately limits urban uses. Since most of the area of this association is in State or Federal land, use is not expected to change.

DYE—Dye-Encierro complex, 5 to 30 percent slopes. This complex consists of areas of shallow, well drained, gently sloping to moderately steep soils on low hills and tops of mesas. Elevation ranges from 4,500 to 7,000 feet. The Dye soil formed in residuum from sandstone, and the Encierro soil formed in residuum from interbedded sandstone and dolomite bedrock.

Dye loam makes up about 60 percent of this complex. Typically, the surface layer is strong brown loam about 1 inch thick. The subsoil is yellowish brown and brown clay

loam about 16 inches thick. Light brown and pale brown sandstone bedrock is at a depth of 17 inches.

The effective rooting depth of this soil is less than 20 inches. Permeability is slow, and available water capacity is very low. Surface runoff is medium, and the erosion hazard is moderate.

Encierro clay loam makes up about 30 percent of this complex. Typically, the surface layer is dark grayish brown clay loam about 2 inches thick. The subsoil is dark grayish brown clay and grayish brown gravelly clay about 11 inches thick. Interbedded dolomite and sandstone bedrock is at a depth of 13 inches.

The effective rooting depth of this soil is less than 20 inches. Permeability is slow, and available water capacity is very low. Surface runoff is medium and the erosion hazard is moderate.

Included in mapping are a few areas of La Fonda and Tortugas soils and Rock outcrop. The La Fonda soils are on small fans, and the Tortugas soils are on ridges. The areas of Rock outcrop are also on ridges. These inclusions make up about 10 percent of the complex.

The Encierro soil is slightly more fertile than the Dye soil, but for both soils management is limited by shallow soil depth. The natural vegetation on this unit is juniper-pinyon woodland with an understory of grasses, forbs, and shrubs. Grazing on these soils should be deferred in the warm season or rotated to benefit warm-season grasses. At least 20 percent of the surface should be covered with vegetation to prevent accelerated erosion. These soils provide some habitat for mule deer.

ECF—Ector-Rock outcrop complex, 20 to 50 percent slopes. This complex consists of relatively small areas of shallow, well drained Ector soil and Rock outcrop. These areas are so intermingled that they could not be separated on the low detail map. The landscape is mainly steep limestone hills, side slopes, mesas, and plateaus dissected by many narrow, rock-controlled drainageways. Mapped areas are broad and are 1,000 to 1,500 acres in size. Individual areas of each part are 10 to 30 acres in size.

Ector gravelly loam makes up about 60 percent of each mapped area. Typically, the surface layer is grayish brown gravelly loam about 9 inches thick. The substratum is light gray extremely gravelly loam about 8 inches thick. This layer is high in lime. Limestone bedrock is at a depth of 17 inches.

This soil is strongly calcareous and moderately alkaline. Permeability is moderate, and available water capacity is very low. In many areas, this soil commonly receives extra runoff water.

Rock outcrop makes up about 25 percent of each mapped area. Typically, it occurs as escarpment caps and faces, slab outcrops, catstep terrace fronts, and large embedded boulders. When the rock is exposed, weathering produces cracks and fractures. Small colluvial slopes of cobbles are below the larger escarpments.

Included with this complex in mapping are small areas of intermingled, deep, gravelly and loamy soils. These soils are primarily along the drainageways and in the small depressions scattered throughout this complex. Also included are small areas of Deama and Lozier soils. The Deama soils are on the northern fringe of mapped areas, where the soils are more cool. The Lozier soils are in the drier southern parts of mapped areas at lower elevations. These included soils make up about 15 percent of this complex.

The plant cover is extremely variable. There is much contrast in vegetation between north-facing and south-facing slopes.

This complex has moderate potential for grazing. Grazing management should improve or maintain the plant cover, let litter accumulate, and prevent accelerated soil erosion.

Grazing should be managed to increase the production and reproduction of the desirable grasses, such as sideoats grama, little bluestem, black grama, plains lovegrass, green sprangletop, Halls panicum, and New Mexico feathergrass and shrubs, such as winterfat and feather peabush, as well as a variety of forbs.

Periodically deferring grazing during the summer growing season, July through September, improves the vigor and reproduction of the warm season grasses. Spring rest encourages growth of the forbs and reproduction of the cool season grasses in the higher and more northern areas of this complex. Fall and winter rest is beneficial to shrubs. Varying the seasons of grazing and rest from year to year maintains a balanced plant community that provides quality forage all year. Continuous year-long grazing results in a plant community dominated by broom snakeweed, catclaw, and fluffgrass. Range in this condition is of little value for grazing and is commonly subject to accelerated soil erosion.

Grazing management that includes fencing, underground pipelines, livestock water facilities, earthen dams and ponds, and mechanical range seeding is not feasible because of the very shallow depth to bedrock. Dams and ponds can be built on the deeper included soils in drainageways. This complex is most efficiently used by combinations of sheep, goats, and cattle.

The potential for wildlife habitat is moderate. The Ector soil produces native plants that provide food and cover for scaled, harlequin, and Gambel quail, mourning and white-winged dove, pronghorn antelope, mule deer, and desert bighorn.

The potential for urban use or farming is low, mainly because of the slope and shallow soil depth. Some small areas of flat included soils could be used for urban development or farming.

ESB—Espy-Shanta Variant association, gently sloping. This association consists of areas of deep and shallow, well drained soils. These soils occur in a regular and repeating pattern on alluvial fans and terraces and

on alluvial bottom land in valleys. The Espy soils are on alluvial fans and terraces in the valley, and the Shanta Variant soils are in the drainageways and on the valley floor. These soils formed in mixed alluvium, mainly from limestone. Mapped areas are generally long and narrow and conform to the shape of the valley. This association occurs primarily in one large area of about 15,000 acres. Individual areas of each soil are 50 to 100 acres in size.

The shallow Espy soils make up about 55 percent of the association. Typically, the surface layer is brown loam about 7 inches thick. The subsoil is brown clay loam about 4 inches thick. The upper 6 inches of the substratum is very pale brown silt loam. The next 5 inches is a layer of indurated caliche. Below that, the substratum is white extremely gravelly silt loam to a depth of more than 60 inches.

These soils are moderately alkaline. Permeability is moderate, and available water capacity is very low.

The deep Shanta Variant soils make up about 20 percent of the association. Typically, the soil is brown silt loam to a depth of more than 60 inches.

These soils are mildly alkaline to moderately alkaline. Permeability is moderately slow, and available water capacity is high.

Included in mapping are small areas of Lozier soils and soils that have indurated caliche between depths of 20 to 40 inches. Also included are some areas of gravelly soils on the sides of the terraces. These soils make up 25 percent of the association.

Potential for grazing is moderate. Grazing management should maintain the plant cover, let litter accumulate, and prevent accelerated erosion.

Grazing should be managed to improve the composition and increase the vigor and production of the more palatable warm-season perennial grasses, such as sideoats grama and black grama. Periodically deferring grazing during July, August, and September is beneficial to these grasses. Spring deferment is beneficial to the minor forbs and cool-season grasses, which are the only source of green forage for sheep and cattle in spring. Changing the season of use and rest from year to year maintains a balanced plant community that provides quality forage for sheep and cattle all year. Continuous year-long grazing results in depletion of the desirable forage and increase of juniper, cholla, algerita, and yucca. Range in this condition is subject to accelerated soil erosion.

Range seeding is practical on depleted areas of the Shanta Variant soils but is not feasible on the shallow Espy soils. The mechanical dozing, grubbing, and stacking of juniper and cholla is practical on both soils and reduces competition for moisture. Stacks of brush enhance scaled quail habitat. The spread of yucca can be checked by letting cows graze in spring when the plants are flowering. The Shanta Variant soils are suitable for earthen ponds and for artificial rain catchments. The lack of well water in this area limits grazing to periods when pond water is available. Because they are deeper than the Espy soils, the Shanta Variant soils are suitable for fences and pipelines. Permanent livestock water facilities help in controlling grazing. The association is most efficiently used by combinations of sheep and cattle.

Potential for wildlife habitat is low. These soils produce native plants that provide food and cover for scaled, harlequin, and Gambel quail, mourning and white-winged dove, pronghorn antelope, and mule deer.

The potential for urban development on this association is low. The indurated caliche layer in the Espy soils restricts most construction. This limitation can be overcome by using heavy ripping equipment. Moderate shrink-swell potential moderately limits both soils. The remote location of this association and the lack of an adequate supply of domestic water also restrict urban development.

GZB—Gypsum land-Holloman complex, 0 to 5 percent slopes. This complex consists of small areas of exposed gypsum and shallow, well drained soils. These areas are so intermingled that they could not be separated on the low detail map. The landscape is mainly broad undulating alluvial uplands surrounding relic playa lakes and drainageways. The Holloman soils formed in highly gypsiferous and calcareous sediments of alluvial and eolian origin. Mapped areas are irregularly shaped and are 500 to more than 1,500 acres in size. Individual areas of each part are 10 to 30 acres in size.

Gypsum land makes up about 45 percent of each mapped area. Typically, it is either hard or soft exposed gypsum more than 60 inches thick. Lacustrine deposits are at a depth of 30 inches in places. In places a deposit of eolian sands less than 1 inch thick is on the surface. Some of the gypsum is in the form of recent dune deposits around the playa lakes, but most is low lying, stabilized dunes or level deposits.

The Holloman soil makes up about 45 percent of each mapped area. Typically, the upper 8 inches is very pale brown very fine sandy loam. Below that is white gypsum to a depth of more than 60 inches. In about 20 percent of the area of Holloman soils, the gypsum is at a depth of 1 to 4 inches.

This soil is slightly saline and calcareous throughout. Permeability is moderate, and available water capacity is very low. Roots commonly reach a depth of 20 inches.

Included with this complex in mapping are small areas of intermingled Alamogordo and Reeves soils. They are mainly in depressions or swales intermixed with the Holloman soils. These soils make up 10 percent of the complex.

This complex has low potential for grazing. In many years, production is barely adequate for small animals and micro-organisms. The soils are very fragile and cannot withstand intensive surface disturbance, such as trampling by livestock. Grazing management should

maintain the plant cover, let litter accumulate, and prevent accelerated erosion on the Holloman soil.

Grazing should be managed to increase the production and reproduction of warm-season grasses, such as black grama, gyp grama, bush muhly, and tobosa. Periodically deferring grazing during the summer growing season, June through August, improves vigor and reproduction of these grasses. Tobosa is dominant on the deeper included soils and the thicker surface Holloman soil. It should be grazed by cattle during the rainy season in July and August, when it is green and growing. Range can be improved by scheduling more rest than use in the grazing system and changing the season of use from year to year. Continuous year-long grazing results in a plant community dominated by low value plants, such as creosotebush and fluffgrass. Range in this condition is usually subject to accelerated soil erosion.

This complex is not suitable for mechanical range seeding because of the small probability that the area will receive enough precipitation for the establishment of seedlings. Underground plastic pipelines and steel drinking troughs are the best method of providing livestock water to control distribution of grazing. Earthen ponds, embankments, and steel pipelines are not feasible because of the solubility and corrosivity of the gypsiferous substratum. Fencing is possible on this complex, but fencing into small grazing units for intensive grazing management has not been economical because forage production and return from grazing are low. Chemical brush management is preferable to mechanical because of the difficulty of establishing new vegetation on disturbed ground.

The potential for wildlife habitat is low for this complex. This complex produces native plants that provide food and cover for scaled and Gambel quail, mourning and white-winged dove, and pronghorn antelope.

The potential for urban use or farming is low, mainly because of the gypsum. Low strength, solubility of the gypsum, and corrosivity severely limit urban use. The severe erosion hazard, very thin surface layer, and salinity are limitations for most crops and are very difficult to overcome.

HOB—Holloman-Gypsum land-Yesum complex, 0 to 5 percent slopes. This complex consists of large areas of shallow and deep, well drained soils and areas of exposed gypsum. These areas are so intermingled that they could not be separated on the low detail map. This complex is on the valley floor of the Tularosa Basin. The soils formed in alluvial and eolian gypsiferous sediment. Mapped areas are wide and elongated and are 4,000 to 10,000 acres in size.

The shallow Holloman soil makes up about 35 percent of the complex. Typically, the surface layer is light brown very fine sandy loam about 3 inches thick. The upper 13 inches of the substratum is pink very fine sandy loam that is very high in gypsum. Below that, the substratum is white gypsum to a depth of more than 60 inches.

This soil is calcareous and mildly alkaline to moderately alkaline throughout. Permeability is moderate, and available water capacity is very low.

Gypsum land makes up about 30 percent of the complex. Typically, less than 1 inch of very fine sandy loam overlies soft to hard, white gypsum.

The deep Yesum very fine sandy loam makes up about 20 percent of the complex. Typically, the surface layer is light brown very fine sandy loam about 3 inches thick. The upper 9 inches of the substratum is light brown fine sandy loam that is high in gypsum. The next 8 inches is pinkish white very fine sandy loam that is very high in gypsum. Below that, the substratum is pink very fine sandy loam to a depth of more than 60 inches.

The soil is calcareous throughout and is mildly alkaline. Permeability is moderate, and available water capacity is moderate. Many fine gypsum crystals are throughout the profile.

Included with this complex in mapping are small intermingled areas of Prelo, Largo, Tome, and Bluepoint soils. Also included are small areas of loamy soils in the narrow drainageways that receive runoff from surrounding areas and dissect the unit. These soils formed in mixed alluvial and eolian sediment that has a moderate amount of gypsum. The included soils make up about 15 percent of this complex. Individual areas of these soils are smaller than 5 acres.

The potential for grazing is low. It is not feasible to use this soil as a regular part of livestock operations because of the thin surface layer, sparse vegetation, and fragile soils. This complex can be used in years of abundant growth, but in most years, the forage is used adequately by wildlife such as jackrabbits and other small mammals and birds. Erosion is accelerated if the surface is disturbed by trampling or overgrazing.

Fencing off this complex would help grazing management of adjacent productive soils and enhance the value of this complex for wildlife habitat. These soils need as much accumulation of vegetation and litter on the surface as possible to reduce the hazard of wind erosion.

The potential of this complex for wildlife habitat is low. This complex produces native plants that provide food and cover for scaled and Gambel quail, mourning and white-winged dove, pronghorn antelope, and mule deer.

The potential for farming and urban use is very low, mainly because of gypsum. Low strength, solubility of the gypsum, and corrosivity severely limit all urban uses and are very difficult to overcome on these soils. Foundations, underground utilities, and septic tank absorption fields are difficult to maintain. Depth to gypsum, salinity of the surface layer, and very low available water capacity limit most crops. The wind erosion hazard is severe where the surface is bare, especially in spring, when strong winds are common.

HPB—Holloman-Reeves association, nearly level. This association consists of areas of shallow and deep, well drained soils. These soils occur in a regular and repeating pattern on broad old basin fill which has been dissected by shallow, wide drainageways. Slopes are 0 to 2 percent overall, but small areas next to the drainageways are as steep as 5 percent. The Holloman soils are generally at the higher positions, and the Reeves soils are in the swales or drainageways. These soils formed in highly calcareous gypsiferous alluvium and eolian material of local origin. Mapped areas are irregular in shape and are 500 to more than 2,000 acres in size. Individual areas of each soil are 10 to 150 acres.

The shallow Holloman soils make up about 60 percent of the association. Typically, the upper 12 inches of the soil is light brown very fine sandy loam that is high in gypsum. Below that, the soil is thickly bedded pink or white gypsum. This material is about 80 percent pure gypsum.

These soils are calcareous throughout and slightly saline. Permeability is moderate, and available water capacity is very low.

The deep Reeves soils make up about 30 percent of the association. Typically, the surface layer is grayish brown silt loam about 4 inches thick. The subsoil is about 20 inches thick. The upper part of the subsoil is grayish brown silt loam, and the lower part is light brownish gray heavy silt loam. The upper 11 inches of the substratum is white silt loam that is high in lime. Below that, the substratum is white silt loam and very fine sandy loam to a depth of more than 60 inches. The lower part of the substratum is high in gypsum.

These soils are calcareous throughout and moderately alkaline. They are slightly saline in the surface layer in places. Permeability is moderate, and available water capacity is moderate.

Included in mapping are a few areas of Tome and Crowflats soils and areas of exposed gypsum. The Tome soils are in the wider drainageways, and the Crowflats soils occur where this unit joins broad alluvial fans. The areas of exposed gypsum are primarily on sides of drainageways and humps on low microridges. These inclusions make up 10 percent of this association.

Most areas of this association are used for grazing and wildlife habitat. Some small areas are used for irrigated crops and houses.

The potential for grazing is low except in the included deeper soils. Grazing management should maintain the plant cover, let litter accumulate, and prevent accelerated wind and water erosion.

Grazing should be managed to maintain or improve the composition, vigor, and production of the more palatable perennial warm-season grasses, such as black grama, alkali sacaton, and vine-mesquite, as well as palatable shrubs and forbs. Periodically deferring grazing during the growing season, July through September, improves vigor and reproduction of these grasses. Spring deferment is beneficial to forbs, and fall and winter rest from grazing encourages the vigor and reproduction of shrubs, such as fourwing saltbush, Mormon-tea, and winterfat. Varying the seasons of grazing and rest from year to year maintains a balanced plant community that provides quality forage all year. Continuous year-long grazing results in a site dominated by creosotebush, American tarbush, and low-value grasses. Range in this condition is usually subject to accelerated soil erosion.

The Reeves soils produce more forage than the Holloman soils because of their higher available water capacity and lower position in the landscape. The Holloman soils, which dominate this association, are extremely fragile and should be stocked conservatively. Once the natural plant community is destroyed by grazing it is very difficult to restore.

Range seeding is not practical on these soils because of the small probability that the area will receive adequate precipitation for establishment of seedlings. Both soils are suitable for fencing, chemical brush management, pipelines, and fabricated livestock watering facilities. Light stands of undesirable brush can be managed mechanically. The soils should not be extensively disturbed because it is difficult to establish new vegetation. Earthen dams and ponds should be placed on the deeper included soils.

The potential of this association for wildlife habitat is low. This association produces native plants that provide food and cover for scaled and Gambel quail, mourning and white-tailed dove, and pronghorn antelope.

The potential for irrigated crops and pasture is moderate to low, depending on the extent of the individual soils. The Holloman soils have low potential and the Reeves soils have moderate potential. Depth to gypsum, salinity of the surface layer, and available water capacity limit plant growth. Where cheap water in large amounts is available, the Reeves soils and the thick-surface Holloman soil have been successfully farmed. The included soils, where their areas are large enough, have high potential for most crops.

The potential for urban use is low because of low strength, solubility of gypsum in water, susceptibility to piping, and corrosivity. Foundations, underground utilities, and septic tank absorption fields are difficult to maintain. There are few adaptable trees that could be used as ornamentals.

JAB—Jal-Tome association, nearly level. This association consists of areas of deep, well drained soils. These soils occur in a regular pattern on large, depressional, relic lakebeds and a few low-lying alluvial fan toe slopes contiguous to the drainageways leading into the lakebeds. Tha Jal soils are mainly on the lakebed. The Tome soils are primarily on the fans but are also scattered along the margins of the lakebed. The Jal soils formed in lacustrine deposits high in carbonates, and the

Tome soils formed in more recent alluvium. Individual areas of each soil are 50 to 2,000 acres in size.

The strongly calcareous Jal soils make up about 80 percent of the association. Typically, the surface layer is very pale brown silt loam about 12 inches thick. The upper 14 inches of the substratum is very pale brown silt loam that is very high in lime. Below that, the substratum to a depth of more than 60 inches is white silt loam with common yellow mottles. This material is a lacustrine deposit and contains less lime than the upper 14 inches of the substratum.

The effective rooting depth of these soils is generally less than 26 inches for most plants. Depth to the underlying lacustrine deposits ranges from 10 to 30 inches. Permeability is moderate, and available water capacity is moderate.

The Tome soils make up about 10 percent of this association. Typically, the surface layer is pale brown very fine sandy loam about 6 inches thick. Below that, the soil to a depth of more than 60 inches is weakly stratified pale brown silt loam and a few lenses of very fine sandy loam. In some places, lacustrine deposits are at a depth of 50 inches.

These soils are calcareous throughout and moderately alkaline. Permeability is moderately slow, and available water capacity is high.

Included in mapping are small intermingled areas of Reyab and Reakor soils. These soils make up about 10 percent of this association.

This association is used for grazing and, to a limited extent, for wildlife habitat.

The Jal soils that have lacustrine deposits at a shallow depth have low potential for grazing, but the Tome soils and the deeper Jal soils have moderate potential. The included Reyab soils and some of the Jal soils flood for short periods. Grazing management should maintain plant cover, let litter accumulate, and prevent accelerated soil erosion.

Grazing should be managed to increase the production and reproduction of the desirable warm-season grasses, such as sideoats grama, black grama, alkali sacaton, and vine-mesquite, and shrubs such as winterfat, fourwing saltbush, and Morman-tea. Periodically deferring grazing during summer, July through August, improves the vigor and reproduction of the grasses. Spring rest from grazing is beneficial to the forbs, and fall and winter rest improves the vigor and reproduction of shrubs. Varying the seasons of grazing and rest from year to year maintains a balanced plant community that provides quality forage all year. Continuous year-long grazing results in a plant community dominated by American tarbush, burrograss, creosotebush, and soaptree yucca. Range in this condition is often subject to accelerated soil erosion.

Mechanical range seeding is only marginally successful on this association and depends on the area receiving adequate precipitation for establishment of seedlings. Reliable precipitation records are not available. Adapted species include improved varieties of sideoats grama, black grama, blue grama, alkali sacaton, fourwing saltbush, and winterfat for the Tome and Reakor soils. In addition to those species, blue panicgrass, indiangrass, and giant sacaton are suitable for the Jal and Reyab soils.

These soils are suitable for fencing, livestock pipelines, and water facilities. Earthen dams and ponds should be placed on the included Reyab soils in the drainageways. Chemical brush management is preferable to mechanical because it disturbs the soil less. The spread of yucca can be checked by letting cows graze while the plants are in flower in May and June.

This association has moderate potential for irrigated crops and pasture. Only a limited amount of water is available for this use. The lacustrine deposits or layers restrict many deep rooted crops. Since the soils have a severe erosion hazard when the surface cover is removed, they must be worked carefully.

The potential of this association for wildlife habitat is low. This association produces native plants that provide food and cover for scaled and Gambel quail, mourning and white-winged dove, and pronghorn antelope.

Because of position, this association has low potential for urban use. The soils are moderately limited for urban use except in the overflow areas.

JEC—Jerag-Philder association, gently rolling. This association consists of areas of shallow, well drained soils. These soils occur in a regular and repeating pattern on broad, gently rolling to nearly level uplands and in small, narrow drainageways. The Jerag soils are in slightly concave, depressional areas on nearly level to undulating uplands, and the Philder soils are in the slightly convex parts of the landscape. These soils formed in alluvium from weathered limestone and small amounts of calcareous eolian sediment. Mapped areas are mostly wide and irregularly shaped and are 100 to 500 acres in size. Individual areas of each soil are 60 to 200 acres.

The Jerag soils make up about 40 percent of this association. Typically, the surface layer is brown very fine sandy loam about 3 inches thick. The subsoil is about 16 inches thick. The upper part of the subsoil is brown sandy clay loam, and the lower part is yellowish brown gravelly loam. The upper 6 inches of the substratum is an extremely hard layer of carbonate cemented material. This layer completely restricts water movement and root penetration. Below this, the substratum is white gravelly silt loam to a depth of more than 60 inches.

These soils are mildly alkaline and noncalcareous above a depth of 9 inches, and moderately alkaline and strongly calcareous below this depth. Permeability is moderate, and available water capacity is very low.

The Philder soils make up about 40 percent of the association. Typically, the surface layer is dark brown

very fine sandy loam about 4 inches thick. The subsoil is about 8 inches thick. The upper part of the subsoil is dark brown sandy clay loam, and the lower part is dark yellowish brown gravelly sandy clay loam. The upper 6 inches of the substratum is yellowish brown very gravelly silt loam. The next 11 inches is an extremely hard layer of carbonate cemented material. This layer completely restricts water movement and root penetration. Below this layer, the substratum is white very gravelly or cobbly silt loam to a depth of more than 60 inches.

These soils are strongly calcareous and moderately alkaline. Permeability is moderate, and available water capacity is very low.

Armesa soils make up about 10 percent of this association. They are adjacent to the wider drainageways and throughout some of the narrower ones. They are deep and well drained. Typically, the surface layer is brown very fine sandy loam about 3 inches thick. The subsoil is brown loam about 15 inches thick. The substratum is white silt loam to a depth of more than 60 inches. The substratum is high in lime.

Armesa soils are strongly calcareous throughout and are moderately alkaline. Permeability is moderate, and available water capacity is very high.

Included in mapping are a few areas of Reyab and Shanta Variant soils and Rock outcrop. The Reyab and Shanta Variant soils are in the small, narrow drainageways that dissect the area. Tencee and Lozier soils occur in some delineations, usually along the steeper sides of drainageways. Individual areas of Reyab and Shanta Variant soils are 5 to 15 acres in size, areas of Lozier and Tencee soils are 1 to 5 acres, and areas of Rock outcrop are generally smaller than 1 acre. These inclusions make up about 10 percent of this association.

All areas of this association are used for grazing. Under proper management the soils of this association have high potential for grazing. Grazing management should maintain the plant cover, let litter accumulate, and prevent accelerated wind and water erosion.

Grazing should be managed to improve the composition and maintain or increase vigor and production of the more palatable warm-season perennial grasses such as black grama, plains bristlegrass, and vine-mesquite, as well as palatable forbs and browse. Periodically deferring grazing is beneficial to forbs, and fall and winter rest from grazing encourages vigor and reproduction of shrubs such as fourwing saltbush, Mormon-tea, and winterfat. Varying the seasons of grazing and rest from year to year maintains a balanced plant community that provides quality forage all year. Continuous year-long grazing results in a site invaded by creosotebush, mesquite, and low-value grasses. Range in this condition is subject to accelerated soil erosion.

Range seeding is only marginally successful on these soils. Reliable precipitation data are not available. Adapted species for range seeding include improved varieties of sideoats grama, blue grama, and black grama. These soils are suitable for chemical brush management. Fencing and livestock pipelines are difficult to install because of the hard lime layer at a shallow depth. The spread of yucca can be controlled by letting cattle graze the flower stalks in May and June. These soils are severely limited for most construction because of the cemented pan above a depth of 20 inches. Fences, underground pipelines, and farm ponds are very difficult to install.

The potential for wildlife habitat is low. This association produces native plants that provide food and cover for scaled quail, mourning and white-winged dove, pronghorn antelope, and mule deer.

This association has very low potential for windbreaks. Windbreak species adapted to this area can do well if the cemented pan is broken and removed at the location of each tree.

This association has very low potential for urban use because of the cemented pan.

LAB—La Fonda association, gently sloping. This association consists of areas of deep, well drained soils. These soils occur in a regular and repeating pattern on alluvial fans and terraces on side slopes of pediments of the Godfrey Hills and the upper valley plain along Three Rivers Creek. The gently sloping La Fonda soils are on the upper parts of alluvial fans grading from foot slopes to the lower valley floor, and the darker colored, gently sloping soils are on the lower parts of the alluvial fans and on terraces adjacent to the flood plain of Three Rivers (see cover). These soils formed in mixed alluvium derived mostly from limestone bedrock. This association occurs in one large area of about 2,000 acres. Individual areas of each soil are 15 to 30 acres in size.

The La Fonda soils make up about 40 percent of the association. Typically, the surface layer is brown loam about 2 inches thick. The subsoil is brown silt loam about 24 inches thick. The substratum is brown clay loam to a depth of more than 60 inches.

These soils are strongly calcareous to moderately alkaline below the surface layer. Permeability is moderate, and available water capacity is high.

The deep, well drained, dark colored soils make up about 25 percent of the association. Typically, the surface layer is brown loam about 16 inches thick. The subsoil is pink silt loam to a depth of more than 60 inches. This layer has many soft masses and filaments of gypsum.

These soils are strongly calcareous and moderately alkaline throughout. Permeability is moderate, and available water capacity is high.

Included in mapping are areas of Bluepoint soils on dunes and Onite soils between the dunes. Also included are small areas of deep Gabaldon and Shanta soils adjacent to the flood plain. These soils formed in mixed alluvium that weathered mostly from limestone. These soils make up about 35 percent of the association.

Potential for grazing is high. Grazing management should maintain or improve the plant cover, let litter accumulate, and prevent accelerated soil erosion.

Grazing should be managed to increase the production and reproduction of the desirable grasses such as little bluestem, alkali sacaton, sideoats grama, black grama, blue grama, New Mexico feathergrass, and a variety of palatable forbs and shrubs such as winterfat and fourwing saltbush. Periodically deferring grazing during the summer growing season, July through September, improves the vigor and reproduction of the warm-season grasses such as sideoats grama and little bluestem. Spring rest from grazing encourages growth of the forbs and reproduction of the cool-season grasses such as New Mexico feathergrass. Fall and winter rest is beneficial to shrubs. Varying the seasons of grazing and rest from year to year maintains a balanced plant community that provides high quality forage all year. Continuous year-long grazing results in a plant community dominated by broom snakeweed, wooly groundsel, cholla, ring muhly, threeawn, and oneseed juniper. Range in this condition is of little value for grazing and is subject to accelerated soil erosion.

Mechanical range seeding is feasible on this association. Adapted species include improved varieties of little bluestem, sideoats grama, spike muhly, black grama, blue grama, and winterfat. Letting cows graze when yucca is in flower controls the spread of yucca. Intensive grazing management that includes fencing, underground pipelines, and livestock watering facilities is practical and easy on this association. Earthen dams and ponds are also feasible but require careful onsite planning. These soils erode easily if the plant cover is removed. Stocking should be carefully balanced with forage production.

This association has moderate potential for irrigated crops. Slope and the erosion hazard are the most limiting factors but can be overcome by good management. Growing irrigated pasture and hay in rotation with row crops and small grain reduces the erosion hazard. Terraces and contour farming are desirable. The La Fonda soils normally have poor tilth, but tilth can be improved on all of the soils by returning crop residues and green manure crops to the soil. Commercial fertilizer is needed to achieve maximum yields.

The potential for wildlife habitat is moderate. These soils produce native plants that provide food and cover for scaled and Gambel quail, mourning and white-winged dove, pronghorn antelope, and mule deer.

The potential for urban development is moderate. The moderate permeability and low strength of the subsoil and substratum are the main restrictions. They limit septic tank absorption fields but can be overcome by increasing the size of absorption field. The limited water supply also restricts intense urban development.

LDB—Largo silt loam, 0 to 3 percent slopes. This deep, well drained, nearly level soil is on broad valley floors of the Tularosa Basin. Slopes are smooth and convex. Individual areas are about 1,500 to 4,000 acres.

Typically, the surface layer is reddish brown silt loam about 4 inches thick. The next layer is reddish brown silty clay loam about 17 inches thick. The substratum is light reddish brown and reddish brown silty clay loam to a depth of more than 60 inches.

Included with this soil in mapping are small areas of Prelo and Ogral soils. Also included are some areas of coarser textured soils in the slightly depressional areas that receive additional water as runon and small intermingled areas of Holloman, Alamogordo, and Tome soils. The included soils make up about 25 percent of the mapping unit. Individual areas of these soils are generally smaller than 20 acres.

This soil is calcareous throughout. In some areas it has small amounts of gypsum in the lower part of the profile. Permeability is moderately slow, and available water capacity is high. Tilth is moderate, and the soil can be worked over a moderate range of moisture conditions. The root zone is deep and can be easily penetrated by plant roots.

The potential for livestock grazing is moderate. Grazing management should maintain or improve the plant cover, let litter accumulate, and prevent accelerated soil erosion.

Grazing should be managed to increase the production and reproduction of the desirable warm-season grasses, such as alkali sacaton, tobosa, vine-mesquite, and plains bristlegrass, and a variety of palatable forbs and shrubs such as fourwing saltbush and winterfat. Periodically deferring grazing during the summer growing season, June though September, improves the vigor and reproduction of the grasses. Spring rest from grazing encourages the forbs, and fall and winter rest is beneficial to shrubs. July and August is the best time to graze tobosa intensively for maximum use while it is green and growing. Varying the seasons of grazing and rest from year to year maintains a balanced plant community that provides high quality forage all year. Continuous year-long grazing results in a plant community dominated by mesquite, creosotebush, American tarbush, yucca, threeawn, burrograss, and fluffgrass. Range in this condition is of little value for grazing and is subject to accelerated soil erosion.

Mechanical range seeding is not feasible on this soil because of the small probability that the area will receive enough precipitation for establishment of seedlings. Chemical brush management is preferable to mechanical because of the difficulty of establishing new vegetation on disturbed ground. The spread of yucca can be checked by letting cows graze while the plants are in flower in May and June.

Intensive grazing management that includes fencing, underground plastic pipelines, and livestock water facilities is possible on this soil. Earthen dams and ponds are not well suited to the Largo soil because of its low

strength and high compressibility as fill material. Dams and ponds would fill with sediment quickly.

The potential for irrigated crops is high. Good yields from row crops and small grains can be obtained under good management. Alfalfa and pasture produce well and should be used in rotation with the row crops and small grain. Good tilth can be maintained by returning plant residue to the soil. Commercial fertilizer helps to achieve maximum yields of all crops. The wind erosion hazard is severe if cultivated crops are grown, especially in winter and spring, when strong winds are common. Minimum tillage, green manure crops, and windbreaks help to reduce runoff, water erosion, and wind erosion.

The potential for wildlife habitat is high. These soils produce native plants that provide food and cover for scaled and Gambel quail, mourning and white-winged dove, pronghorn antelope, mule deer, and desert bighorn.

This soil is used for urban development. Low strength, susceptibility to piping, moderate shrink-swell potential, and compressibility limit most construction practices but can be overcome by using suitable fill material for foundations and by good design and careful installation. Some areas need protection from flooding during the rainy season. Some homesites on or near small flood plains have been flooded. This soil is not suitable fill material for dikes and diversions because of low strength and high compressibility. The moderately slow permeability limits septic tank absorption fields, but can be overcome by increasing the size of the absorption area or by modifying the filter field itself. Ground water could be contaminated if strata of gravel are within several feet of the surface. Central sewage systems should be considered if the population density continues to increase. Corrosion of underground utilities is a severe limitation, but using noncorrodible materials eliminates the problem.

LGB—Largo-Ogral complex, 0 to 5 percent slopes. This complex consists of small areas of deep, well drained soils. These soils are so intermingled that they could not be separated on the low detail map. The landscape is mainly the broad, partially dissected lower part of toe slopes of pediments. Soils on the margins of drainageways are partially truncated. Mapped areas are irregularly shaped and are more than 1,000 acres in size. Individual areas of each part are 5 to 30 acres in size.

The Largo soil makes up about 45 percent of each mapped area. Typically, the soil is reddish brown silt loam to a depth of more than 60 inches. A few thin strata of very fine sand are below a depth of 24 inches.

This soil is slightly calcareous throughout and is moderately alkaline. Permeability is moderately slow, and available water capacity is high.

The Ogral soil makes up about 35 percent of each mapped area. Typically, the surface layer is reddish brown very fine sandy loam about 6 inches thick. The next layer is reddish brown fine sandy loam about 12 inches thick. The substratum is reddish brown very gravelly fine sandy loam to a depth of more than 60 inches. A desert pavement less than 2 inches thick is on the surface in most areas of this soil.

Permeability of this soil is moderately rapid, and available water capacity is low. In some areas this soil has 15 to 35 percent gravel, but interpretations and use are almost the same as for the typical Ogral soil.

Included with this complex in mapping are small intermingled areas of McCullough, Prelo, Aztec, and Alamogordo soils. Also included are small areas of Gullied land. The McCullough and Prelo soils are primarily on lower benches and depressions. The Alamogordo and Aztec soils are on small ridge crests or are intermixed with the Ogral soils. Gullied land is contiguous to the major drainageways along side drainageways. These inclusions make up about 20 percent of this complex.

Potential for grazing is moderate. Grazing management should maintain or improve the plant cover, let litter accumulate, and prevent accelerated soil erosion.

Grazing should be managed to increase the production and reproduction of the desirable warm-season grasses, such as alkali sacaton, plains bristlegrass, Arizona cottontop, twoflower trichloris, and tobosa, and a variety of palatable forbs, such as croton, globemallow, and zinnia, and shrubs such as winterfat, fourwing saltbush, and Mormon-tea. Periodically deferring grazing during the summer growing season, June through September, improves the vigor and reproduction of the grasses. Spring rest from grazing encourages the forbs, and fall and winter rest is beneficial to shrubs. Varying the seasons of grazing and rest from year to year maintains a balanced plant community that provides high quality forage all year. Continuous year-long grazing results in a plant community dominated by creosotebush, American tarbush, yucca, cacti, burrograss, and threeawn. Range in this condition is of little value for grazing and is subject to accelerated soil erosion.

Mechanical range seeding is not feasible on this complex because of the small probability that the area will receive enough precipitation for establishment of seedlings. Chemical brush management is preferable to mechanical because of the difficulty of establishing new vegetation on disturbed ground. The spread of yucca can be checked by letting cows graze while the plants are in flower in May and June. Intensive grazing management that includes fencing, underground pipelines, and livestock watering facilities is feasible on this complex. Earthen dams and ponds should be built on the Largo soil and not on the porous, gravelly Ogral soil.

The potential for wildlife habitat is moderate. These soils produce native plants that provide food and cover for scaled and Gambel quail, mourning and white-winged dove, and pronghorn antelope.

The potential for urban use or farming is moderate to low. The dissected parts of the landscape and the gravelly Ogral soil limit urban use. If diversions are used to

change watercourses, great care must be taken not to flood previously unaffected areas. The Largo soil has low strength and is susceptible to piping. Larger septic tank filter fields are necessary because of the moderately slow permeability. Small areas of this complex can be farmed; however, where both soils occur in a field, proper water management is almost impossible because of the difference in available water capacity and permeability of the soils.

Adapted windbreak species can be established where irrigation water is available.

LOB—Lozier-Rock outcrop complex, 0 to 5 percent slopes. This complex consists of areas of shallow, well drained Lozier soil and limestone outcrop. These areas are so intermingled that they could not be separated on the low detail map. This complex is on narrow and broad upland plateaus or mesa tops that are bedrock controlled. Mapped areas are 150 to 640 acres in size. Individual areas of each part are 5 to 50 acres in size.

Lozier gravelly loam makes up about 75 percent of each mapped area. Typically, the surface layer is light brownish gray and pale brown gravelly loam about 7 inches thick. The substratum is white very gravelly silty clay loam about 8 inches thick. It is high in lime. Unweathered limestone bedrock is at a depth of about 15 inches.

This soil is strongly calcareous throughout and moderately alkaline. Permeability is moderate. Available water capacity is very low, but in areas contiguous to the Rock outcrop, runon water is available for plant growth. Water is also held above the limestone bedrock.

Rock outcrop makes up about 15 percent of each mapped area. Much of the outcrop is intermingled throughout the unit, but some occurs along the fringe areas near the escarpment edge. Some rock is exposed where drainageways dissect the unit.

Included with this complex in mapping are small intermingled areas of Tencee and Reakor soils. The Tencee soils occur throughout the areas. The Reakor soils are in narrow drainageways. In this complex the Reakor soils have a gravelly surface layer about 3 inches thick. These soils make up about 10 percent of this complex. Individual areas of these soils are smaller than 10 acres.

This complex has low potential for grazing. Grazing management should maintain the plant cover, let litter accumulate, and prevent accelerated soil erosion. The Rock outcrop sheds additional water onto the adjacent soils, increasing the amount of water available for plants.

Grazing should be managed to increase the composition and production of the warm-season perennial grasses such as black grama, sideoats grama, plains bristlegrass, and green sprangletop. Periodically deferring grazing during July, August, and September permits these grasses to improve in vigor and reproduce. Scheduling periods of grazing and rest at different times of the year encourages a greater variety of forage species. Continuous year-long grazing results in a cover of brush and undesirable grasses.

Range seeding is not feasible because of the shallow soil depth, Rock outcrop, and small probability that the area will receive enough precipitation for establishment of seedlings. The shallow depth and rock also limit the feasibility of fencing, pipelines, and watering facilities.

The potential for wildlife habitat is low. This complex produces native plants that provide food and cover for scaled quail, mourning and white-winged dove, mule deer, and desert bighorn. Maintaining a balanced community of shrubs, grasses, and forbs for food and cover is important in managing this complex for wildlife habitat.

The potential for urban use or farming is low because of shallow, gravelly soils and the thickly bedded limestone bedrock. These problems limit underground pipelines, water tanks, and fencing.

LOD—Lozier-Rock outcrop complex, 5 to 20 percent slopes. This complex consists of areas of shallow, well drained soils and limestone outcrop. These areas are so intermingled that they could not be separated on the low detail map. This complex is on rock-controlled side slopes of pediments at the base of steeper limestone hills. Mapped areas are elongated and are 320 to 640 acres in size. Individual areas of each part are 10 to 20 acres in size.

Lozier very gravelly loam makes up about 60 percent of each mapped area. Typically, the surface layer is light brownish gray and pale brown very gravelly loam about 7 inches thick. The substratum is white very gravelly loam and very gravelly silty clay loam about 8 inches thick. It is high in lime. Unweathered limestone bedrock is at a depth of about 15 inches.

This soil is strongly calcareous throughout and moderately alkaline. Permeability is moderate. Available water capacity is very low, but the soil receives extra water as runon from the Rock outcrop.

Rock outcrop makes up about 25 percent of each mapped area. The outcrop consists of limestone bedrock in the form of catstep escarpments or shelves, exposed flat outcrops or partially buried boulders more than 3 feet in diameter. Some marginal fractures occur on the exposed rock. There are small areas of colluvial rock slides.

Runoff is rapid on the rock. This water has accelerated erosion on other parts of the area.

Included with this complex in mapping are small intermingled areas of Tencee and Nickel soils. Also included are small narrow valleys of Reakor or Tome soils. The Tencee soils are on the lower side slopes of pediments near the edge of mapped areas. The Nickel soils are primarily on colluvial slopes scattered throughout this complex. These soils make up about 15 percent of this complex. Individual areas of these soils are generally smaller than 10 acres.

This complex has low potential for grazing. Grazing management should maintain the plant cover and prevent erosion. Rock outcrop sheds additional water onto the adjacent soils, increasing the amount of water available for plants.

Grazing should be managed to increase the composition and production of the warm-season perennial grasses such as black grama, sideoats grama, green sprangletop, and plains bristlegrass. Periodically deferring grazing during July, August, and September permits these grasses to improve in vigor and reproduce. Scheduling periods of grazing and rest at different times of the year encourages a greater variety of forage species.

The shallow soil depth limits the feasibility of fencing, pipelines, and water storage facilities.

The potential of this complex for wildlife habitat is moderate. The soils of this complex produce native plants that provide food and cover for scaled and Gambel quail, mourning dove, mule deer, and desert bighorn.

The potential for urban use, farming, or recreation is low. Slope, Rock outcrop, gravelly surface layer, and shallow depth to bedrock are very difficult to overcome.

MEA—Mead silty clay loam, 0 to 1 percent slopes. This deep, poorly drained, nearly level soil is on outer fringes of alluvial fans. This soil formed in fine textured alluvium over lacustrine lake sediment. It is very high in salt accumulation because of periodic flooding and poor drainage. Slopes are smooth and concave. The unit is in one area of about 2,100 acres. The area is elongated, conforming to narrow bottom land.

Typically, the surface layer is reddish brown silty clay loam and clay loam about 5 inches thick. The substratum, to a depth of 48 inches, is light reddish brown clay that has a high content of salts. Below that, the substratum is lacustrine material of variable texture and color to a depth of more than 60 inches.

Included with this soil in mapping are areas of Holloman soils and Gypsum land along the margins of the unit on steep, short gully sides and knolls. These inclusions make up about 15 percent of the map unit. Individual areas are generally smaller than 10 acres.

This soil is moderately calcareous throughout and is moderately to strongly alkaline. It has a layer of salt that is more soluble than gypsum. Permeability is very slow, and available water capacity is low. Tilth is poor, and the soil can be worked only over a narrow range of moisture conditions. Restrictive layers of salt limit the choice of vegetation to plants that are very salt tolerant.

This soil has very low potential for grazing. Because of the salt content of the soil, only sparse stands of iodinebush and alkali sacaton grow.

This soil has very low potential for farming. High salt content and seepage of water from adjacent sewage lagoons limit crops. Also, since most areas of this soil are under military control, they are not used for farming.

The potential for wildlife habitat is very low. This soil produces very few native plants that provide little or no food and cover for wildlife. This soil is highly saline and is flooded much of the year.

Because of the proximity of Holloman Air Force Base, small areas of this soil have been used for urban development. The main use is sites for sewage lagoons, but some houses and other facilities are built on this soil. The high shrink-swell potential severely restricts buildings and roads but can be overcome by good design and use of good foundation material. The very slow permeability limits septic tank absorption fields, but this can be overcome by increasing the size of the absorption area or modifying the filter field itself. Sewage lagoons have few limitations on this soil and many be used instead of absorption fields. Lawns, shrubs, and trees planted should be highly tolerant of salt. This soil has a fluctuating water table which could lead to contamination of ground water by effluent from sewage systems. Some small depressional areas of this soil are flooded periodically by overflow or seepage from several sewage lagoons.

MJA—Mimbres-Jal association, nearly level. This association consists of areas of deep, well drained calcareous soils. These soils occur in a regular and repeating pattern on a large depressional relic lakebed and around the margin of the lake on toe slopes of alluvial pediments. The Mimbres soils occur throughout the area, and the Jal soils are in the lower lying depressions on the fringe of the mapped areas. These soils formed in alluvium derived from limestone. They are underlain at a depth of 30 to 50 inches by old lacustrine deposits many feet thick. Individual areas of each soil are 100 to 400 acres in size.

The Mimbres soils make up about 80 percent of this association. Typically, the surface layer is pale brown and brown silt loam about 12 inches thick. The upper part of the subsoil is light brown silt loam about 13 inches thick, and the lower part is light brown silty clay loam about 11 inches thick. Lime content increases in the lower part of the subsoil. The substratum is light brown silty clay loam to a depth of 48 inches. Below that, the substratum is a lacustrine deposit of mottled, very pale brown stratified silt.

These soils are calcareous throughout and have lime segregations in the lower part of the subsoil. They are moderately alkaline. Permeability is moderately slow, and available water capacity is high.

The Jal soils make up about 10 percent of this association. Typically, the surface layer is light brownish gray silt loam about 4 inches thick. The substratum, to a depth of 28 inches, is very pale brown silt loam. Below that, the substratum is lacustrine sediment of very pale brown stratified silt loam containing mottles of brownish yellow. This material contains less lime than the overlying material.

These soils are strongly calcareous. Permeability is moderate, and available water capacity is low. The effective rooting depth is generally less than 28 inches for most plants.

Included in mapping are small areas of Tome, Reakor, and Bluepoint soils. Tome soils are on toe slopes along the fringe of mapped areas and make up about 5 percent of this association. Reakor soils are near the lower fringe of pediments and make up about 3 percent of the association. Bluepoint soils are along the eastern edge of the unit and make up about 2 percent of this association.

This association is used for grazing and wildlife habitat.

This association has moderate potential for grazing. Lakes scattered throughout this unit provide water for livestock for at least 6 months in most years. Grazing management should maintain the plant cover, let litter accumulate, and prevent accelerated soil erosion.

Grazing should be managed to increase the production and reproduction of the desirable warm-season grasses, such as sideoats grama, vine-mesquite, and alkali sacaton, and shrubs, such as fourwing saltbush, winterfat, and Mormon-tea. Periodically deferring grazing during the summer growing season, June through August, improves the vigor and reproduction of the grasses. Spring rest from grazing is beneficial to the forbs, and fall and winter rest improves the vigor and reproduction of shrubs. Varying the seasons of grazing and rest from year to year maintains a balanced plant community that provides quality forage all year. Continuous year-long grazing results in a plant community dominated by American tarbush, creosotebush, cholla, soaptree yucca, threeawn, and burrograss. Range in this condition is of little value for grazing and is commonly subject to accelerated soil erosion.

This association is suitable for earthen structures, such as dams and ponds, except on the Jal and Bluepoint soils. Fencing, underground pipelines, and livestock watering facilities are feasible on this association. Brush can be managed by either chemical or mechanical means. Cholla can be root cut and stacked. Thick stands of creosotebush and tarbush can be root-plowed and seeded. The spread of yucca can be checked by letting cows graze while the plants are in flower in May and June. A burning technique has not been developed for this association, but a few accidental fires have improved forage condition.

This association has moderate potential for wildlife habitat. These soils produce native plants that provide food and cover for scaled and Gambel quail, mourning and white-winged dove, and pronghorn antelope.

This association has high potential for irrigated crops and pasture, but since water is scarce, none has been grown. The lacustrine deposits and the high lime content in the Jal soils limit crops and pasture. The erosion hazard is severe if the surface is disturbed. Care is needed in stocking during dry years.

Because of its location, this association has low potential for urban use. The soils do not have major limitations except near the intermittent lakes and where they receive runon water from surrounding areas.

MPA—Mimbres-Prelo association, nearly level. This association consists of areas of deep, well drained soils. These soils occur in a regular and repeating pattern on the lower parts of alluvial fans, bottom lands, and terminus fans in the closed basin. The Mimbres soils are primarily on the bottom land and outer fringes of fans, and the Prelo soils are primarily on the lower lying alluvial fans. During the brief but intense storms, the Mimbres soils receive runon water from the surrounding soils. The Mimbres soils formed in calcareous alluvium, and the Prelo soils formed in calcareous and gypsiferous alluvium. Both soils have received deposits of eolian material. The mapped areas are wide and elongated and are 1,000 to 1,500 acres in size. Individual areas of each soil are 40 to 100 acres.

The Mimbres soils make up about 50 percent of the association. Typically, the surface layer is pale brown very fine sandy loam about 6 inches thick. The subsoil is brown and pale brown silty clay loam about 23 inches thick. Small filaments of lime are present in the lower part of the subsoil. The substratum is very pale brown silt loam to a depth of more than 60 inches.

These soils are strongly calcareous throughout and are moderately alkaline. Permeability is moderately slow, and available water capacity is high.

The Prelo soils make up about 20 percent of the association. Typically, the surface layer is reddish brown silt loam about 8 inches thick. The upper 16 inches of the subsoil is reddish brown silty clay loam, and the lower 8 inches is reddish brown silty clay loam that contains a few soft masses of gypsum. The substratum, to a depth of more than 60 inches, is reddish brown silty clay loam and contains common, fine filaments and small, soft masses of gypsum.

These soils are moderately calcareous in the surface layer and strongly calcareous in the subsoil and substratum. They are moderately alkaline. Permeability is moderately slow, and available water capacity is high.

Included in mapping are areas of Reyab, Holloman, Reeves, and Largo soils. The Reyab soils are in elongated, narrow drainageways and are flooded by water from surrounding areas. The other soils are on small ridgetops and uplands. A few gullies and gravelly channel bottoms are scattered throughout many mapped areas. These inclusions make up about 30 percent of this association. Individual areas of these soils are 5 to 10 acres in size.

This association has moderate potential for grazing. Grazing management should improve or maintain the plant cover, let litter accumulate, and prevent accelerated soil erosion.

Grazing should be managed to increase the production and reproduction of the desirable warm-season grasses such as sideoats grama, cane bluestem, twoflower trichloris, and alkali sacaton. Periodically deferring grazing during the summer growing season, June through September, improves the vigor and reproduction of the grasses. These months are the best time to graze tobosa intensively for maximum use while it is green and growing. Spring rest from grazing is beneficial to the forbs, and fall and winter rest improves the vigor and reproduction of shrubs. Varying the seasons of grazing and rest from year to year maintains a balanced plant community that provides quality forage all year. Continuous year-long grazing results in a plant community dominated by American tarbush, creosotebush, yucca, threeawn, and burrograss. Range in this condition is of little value for grazing and is commonly subject to accelerated soil erosion. If the natural plant cover is destroyed on the Prelo soils, erosion cuts deep, vertical-walled gullies.

Mechanical range seeding is not feasible on this association because of the small probability that the area will receive enough precipitation during any given period for establishment of seedlings. These soils are well suited to grazing management that includes fencing, underground plastic pipelines, livestock watering facilities, small earthen dams, and ponds. Large earthen structures are not suitable for the Prelo soils because of solubility of the gypsum substratum. Chemical brush management is preferable to mechanical because of the difficulty of establishing new vegetation on disturbed soils. The spread of yucca can be checked by letting cows graze while the plants are in flower in May and June.

In urban areas, this association is used for homesites, trailer parks, and commercial buildings. The Mimbres soils have few restrictions for urbanization, although the moderately slow permeability affects septic tank absorption fields, and the moderate shrink-swell potential affects foundations and roads. These limitations can be overcome by careful installation. Flooding is a problem in some areas of the Mimbres soils. The Prelo soils are limited for urban use. The permeability and shrink-swell potential are the same for the Mimbres soils. The gypsum content of the substratum affects foundations, underground utilities, and septic tank absorption fields. The substratum is unstable because the gypsum dissolves in excess water. Corrosivity to steel and concrete is high because of the gypsum. Care must be taken when building on these soils.

This association has moderate potential for wildlife habitat. These soils produce native plants that provide food and cover for scaled and Gambel quail, mourning and white-winged dove, pronghorn antelope, and mule deer.

Farming on this association includes irrigated pasture and cropland. The main crop is alfalfa for hay and some pasture. Tall wheatgrass and tall fescue are the primary cool-season grasses grown for irrigated pasture. Rooting depth of some crops is limited in the Prelo soils by the gypsum. Most crops or grasses can be grown quite successfully on both soils if fertilizer is added. Cotton, small grain, pecan trees, and fruit trees are also grown on these soils and do well under a high level of management.

Erosion by wind and water is a hazard if the plant cover is removed. Returning crop residue to the soil and minimum tillage reduce this hazard. Permanent cover crops such as pasture grasses or alfalfa also reduce the erosion hazard.

MTA—Mimbres-Tome association, nearly level. This association consists of areas of deep, well drained soils. These soils occur in a regular and repeating pattern on the lower parts of alluvial fans, bottom lands, and outer fringes of fans in the basin adjacent to uplands with low relief. The Mimbres soils are on the bottom lands and the fringes of fans, and the Tome soils are on the alluvial fans. These soils formed in medium textured alluvium derived from limestone and siltstone and some calcareous eolian material. Mapped areas are irregular in shape. They are 800 to 3,000 acres in size. Individual areas of each soil are 40 to 200 acres.

The Mimbres soils make up about 45 percent of the association. Typically, the surface layer is pale brown silt loam about 6 inches thick. The subsoil is pale brown and brown silty clay loam about 19 inches thick. The substratum is pale brown and brown silty clay loam to a depth of more than 60 inches.

These soils are strongly calcareous and moderately alkaline throughout. Permeability is moderately slow, and available water capacity is high. These areas may be flooded for short periods following intense rainstorms.

The Tome soils make up about 40 percent of this association. Typically, the surface layer is pale brown silt loam about 5 inches thick. Below that, to a depth of 60 inches, the soil is brown silt loam with thin lenses of very fine sandy loam.

These soils are calcareous throughout and are moderately alkaline. Permeablity is moderately slow, and available water capacity is high.

Included in mapping are a few areas of Nickel and Reyab soils. The Nickel soils are on small ridges scattered throughout some mapped areas. The Reyab soils are on overflow sites on bottom land in narrow unchannelized draws. These soils make up about 15 percent of this association. Individual areas of these soils are 10 to 30 acres in size.

This association is mainly on land controlled and used by the military. One large area is used for grazing and irrigated crops. In urban areas this association is used for homesites, trailer pads, and small commercial buildings.

This association has moderate potential for grazing. Grazing management should improve or maintain the

plant cover, let litter accumulate, and prevent accelerated soil erosion.

Grazing should be managed to increase the production and reproduction of the desirable warm-season grasses, such as sideoats grama, black grama, alkali sacaton, and shrubs such as fourwing saltbush and Mormon-tea. Periodically deferring grazing during the summer growing season, June through September, improves the vigor and reproduction of the grasses. This period is also the best time to graze tobosa intensively for maximum use while it is green and growing. Spring rest from grazing is beneficial to the forbs, and fall and winter rest improves the vigor and reproduction of shrubs. Varying the seasons of grazing and rest from year to year maintains a balanced plant community that provides quality forage all year. Continuous year-long grazing results in a plant community dominated by American tarbush, creosotebush, mesquite, yucca, threeawn, and burrograss. Range in this condition is of little value for grazing and is commonly subject to accelerated soil erosion.

Mechanical range seeding is not feasible on this association because of the small probability that the area will receive enough precipitation for establishment of seedlings. These soils are well suited to grazing management that includes fencing, underground pipelines, livestock watering facilities, small earthen dams, and ponds. Chemical brush management is preferable to mechanical because of the difficulty of establishing new vegetation on disturbed soils. The spread of yucca can be checked by letting cows graze while the plants are in flower in May and June.

This association has moderate potential for wildlife habitat. These soils produce native plants that provide food and cover for scaled and Gambel quail, mourning and white-winged dove, pronghorn antelope, and mule deer.

The soils have some features that limit urban uses unless taken into consideration before construction. Both soils have moderately slow permeability that affects septic tank absorption fields and a moderate shrink-swell potential that restricts road location and foundations for buildings unless installation is careful. Corrosivity to steel pipe is moderate in both soils because of the electrical conductivity. Copper or plastic pipe should be used if possible. Buildings should not be placed in areas where overflow is common.

Farming on this association includes irrigated pasture and some irrigated crops. Tall wheatgrass, tall fescue, and alfalfa are the main pasture and hay crops, but some small grains such as barley and oats are also grown. The potential for these crops and grasses is moderate to high, depending on how much water is available for irrigation. Crop residue management, minimum tillage, and windbreaks reduce the severe hazard of wind erosion. All crops except legumes respond to nitrogen, and legumes respond to phosphate.

MXC—Montecito loam, 0 to 10 percent slopes. This nearly level to sloping, deep, moderately well drained soil is on alluvial fans. Elevation ranges from 5,300 to 6,500 feet. This soil formed in alluvium derived from sandstone, limestone, and dolomite.

Typically, the surface layer is yellowish brown loam about 3 inches thick. The subsoil is brown clay loam to a depth of 60 inches. The substratum is pinkish white clay loam.

Included with this soil in mapping are small areas of Dye and Encierro soils.

Effective rooting depth is more than 60 inches. Permeability is moderately slow, and available water capacity is high. The erosion hazard is slight.

The natural vegetation on this unit is scattered oneseed juniper and pinyon pine and an understory of warm-season grasses and forbs.

This soil is one of the most productive in the Guadalupe Mountains, but gully and sheet erosion has reduced management possibilities. This soil is used mainly for grazing. Grazing should be managed to maintain ground cover and prevent the potentially severe compaction of the soil. Revegetation is possible in some areas that are not too badly eroded.

This unit provides some habitat for mule deer. Also, this is the only soil in the Guadalupe Mountains suitable for septic tank absorption fields and other uses that require deep soil. The moderately slow permeability limits septic tank absorption fields, but can be overcome by increasing the size of the absorption area or modifying the filter field itself.

NTD—Nickel-Tencee association, strongly sloping. This association consists of areas of deep and shallow, well drained soils. These soils occur in a regular and repeating pattern on pediment toe slopes and alluvial fans dissected by many drainageways. The Nickel soils are on alluvial fans and are adjacent to the drainageways. The Tencee soils are on side slopes of pediments and the upper parts of the older alluvial fans. These soils formed in highly calcareous, coarse textured sediment derived from limestone. Mapped areas conform in shape and dimensions to the alluvial fans and pediment slopes. They are 300 to more than 2,000 acres in size. Individual areas of each soil are 20 to 100 acres in size.

The deep Nickel soils make up about 50 percent of the association. Typically, the surface layer is very pale brown gravelly very fine sandy loam about 5 inches thick. The upper 12 inches of the substratum is pale brown gravelly fine sandy loam. Below that, the substratum is white and very pale brown very gravelly sandy loam to a depth of more than 60 inches. This layer is very high in lime, but lime content decreases with depth. The gravel content increases from 20 percent in the surface layer to 75 percent in the lower part of the substratum.

These soils are strongly calcareous throughout and moderately alkaline. Permeability is moderately slow, and available water capacity is low.

The shallow Tencee soils make up about 35 percent of this association. Typically, the upper 15 inches of the soil is grayish brown and light brown very gravelly silt loam and very gravelly sandy loam. This layer is 35 to 80 percent gravel in the form of indurated carbonate nodules and subrounded limestone fragments. The next 18 inches is an indurated lime layer that is impervious to roots and water. Below this, the soil is white and light gray cobbly silt loam to a depth of more than 50 inches. In some areas the indurated lime layer is at a depth of about 25 inches, but this difference does not affect use or interpretations of the soil.

These soils are strongly calcareous throughout and are moderately alkaline. Permeabilty is moderate, and available water capacity is very low. In some areas these soils receive runon water from the surrounding areas, especially from areas that are largely rock outcrop.

Included in mapping are a few areas of Lozier, Tome, and Reakor soils. The Lozier soils are on small, rock-controlled knolls and hills. The Tome soils are in nearly level areas at the bottom of alluvial fans. The Reakor soils are also on the fans and near the edges of mapped areas. These soils make up about 15 percent of the association.

In the extreme northeastern part of the survey area near the Chaves County line, the soils in this association have a darker surface layer. This does not affect the interpretations of this association. Along pediments south of Alamogordo, the proportion of the Tencee soil is very small.

Most areas of this association are used for grazing and wildlife habitat.

Most parts of this unit have good potential for grazing. Grazing management should maintain the plant cover, let litter accumulate, and prevent accelerated soil erosion.

Grazing should be managed to increase the more palatable warm-season grasses, such as sideoats grama, plains bristlegrass, bush muhly, black grama, and alkali sacaton. The Nickel soils provide greater rooting depth and are capable of producing small amounts of taller bunch grasses, such as Arizona cottontop and cane bluestem. Both soils produce valuable browse, such as winterfat, Mormon-tea, and fourwing saltbush, which are used by livestock in late fall, winter, and early spring. Rest from grazing during summer improves the vigor and production of the grasses. Rest from grazing during fall improves the production, vigor, and population of shrubs. The best improvement in range condition is achieved by varying the periods of grazing and rest from year to year. Continuous year-long grazing results in stands of creosotebush, catclaw, and scattered low-value grasses. Range in this condition is subject to accelerated soil erosion and loss of ability to produce forage.

These soils are not suitable for range seeding, because of the small probability that the area will receive enough precipitation for establishment of seedlings. The Nickel soils are more suitable for mechanical brush management, pipelines, fencing, and watering facilities than the shallower Tencee soils. Letting cows graze yucca in spring when it is in flower helps to control the increase of yucca. The scarcity of natural watering places restricts use by livestock and wildlife.

This association has low potential for wildlife habitat. These soils produce native plants that provide food and cover for scaled and Gambel quail, mourning and white-winged dove, pronghorn antelope, mule deer, and desert bighorn.

The soils of this association have no potential for irrigation.

The potential for urban use is low because of the shallow depth of the Tencee soils and the gravel content of both soils. The shallow depth restricts septic tanks, underground utilities, and foundations. The deep gravel deposits may not filter out solids from septic tank effluent and therefore may allow contamination of ground water.

OPB—Onite-Pintura association, gently sloping. This association consists of areas of well drained and somewhat excessively drained soils. The soils are deep. These soils occur in a regular and repeating pattern on broad eolian and alluvial uplands dissected by a few entrenched intermittent stream channels. The Onite soil is on nonduned uplands, and the Pintura soil is on dunes and parts of the areas between the dunes. The soils formed in coarse textured to medium textured alluvium and reworked eolian sediment. Individual areas of each soil are 0.5 to 40 acres in size.

The well drained Onite soils make up about 55 percent of this association. Typically, the surface layer is brown loamy fine sand about 10 inches thick. The subsoil is brown sandy loam about 20 inches thick. The substratum is brown and light brown sandy loam to a depth of more than 60 inches.

These soils are noncalcareous in the surface layer and strongly calcareous below. They are mildly alkaline to moderately alkaline. Permeability is moderately rapid, and available water capacity is low.

The somewhat excessively drained Pintura soils make up about 25 percent of the association. Typically, the surface layer is light reddish brown loamy fine sand about 12 inches thick. The upper 18 inches of the substratum is light reddish brown fine sand. Below that, the substratum is light reddish brown loamy fine sand to a depth of more than 60 inches.

These soils are slightly calcareous throughout and are mildly alkaline to moderately alkaline. Permeability is rapid, and available water capacity is low.

Included in mapping are a few areas of deep, dark colored, loamy soils more than 60 inches deep. They are

on elongated bottom lands that dissect parts of the larger mapped areas. These soils formed in medium textured material washed in from the mountains to the east. Areas of these soils are 40 to 100 acres in size. Also included are small areas of exposed gypsum and Alamogordo soils. The inclusions make up about 20 percent of the association.

This association is used for grazing and wildlife habitat. Because of location, other use is limited.

This association has moderate potential for grazing. Grazing management should improve or maintain the plant cover, let litter accumulate, and prevent accelerated soil erosion.

Grazing should be managed to increase the production and reproduction of the desirable warm-season grasses, such as black grama, bush muhly, plains bristlegrass, and giant dropseed, and shrubs such as Mormon-tea. Periodically deferring grazing during the summer growing season, June through September, improves the vigor and reproduction of these grasses. Spring rest from grazing is beneficial to the forbs, and fall and winter rest benefits shrubs. The previous year's growth should be left standing during the windy season, February through May, to prevent excessive wind erosion. Varying the seasons of grazing and rest from year to year maintains a balanced plant community that provides quality forage all year. Continuous year-long grazing results in a plant community dominated by mesquite, sand sagebrush, yucca, and threeawn. Range in this condition is of little value for grazing and is subject to accelerated wind erosion.

Mechanical range seeding is not feasible on this association because of the small probabilitiy that the area will receive enough precipitation for establishment of seedlings. Chemical brush management is preferable to mechanical because of the difficulty of establishing new vegetation. The spread of yucca can be checked by letting cows graze while it is in flower in May or June. Intensive livestock management that includes fencing, underground pipelines, and livestock watering facilities is feasible throughout this association. Earthen livestock tanks and dams should be placed on the less permeable included soils in depressional areas near the drainageways. The forage and browse produced on this association is coarse and is most efficiently used by mature cows.

The potential for urban use is low because of location. The soils have no features that restrict homesites, small buildings, roads, or underground utilities. The moderately rapid to rapid permeability, however, may allow septic tank effluent to contaminate ground water. Stock water ponds can be built only on the included soils on bottom lands, since only they can hold water for very long.

This association has low to moderate potential for wildlife habitat. These soils produce native plants that provide food and cover for scaled and Gambel quail, mourning and white-winged dove, and pronghorn antelope.

This association is not used for irrigated pasture or crops. The potential for farming is low because of the moderately rapid to rapid permeability, severe erosion hazard, and lack of water in the immediate area. Since the available water capacity of the soils is low, crops would require a unique irrigation system. Any crops grown should be permanent to reduce the hazard of wind erosion.

PAE—Pena-Aztec Variant association, strongly sloping. This association consists of areas of deep, well drained soils. These soils occur in a regular and repeating pattern mainly on side slopes of pediments that have been dissected by many deep, narrow drainageways. The Pena soils are on the upper, more gently sloping parts of the pediment slopes. The Aztec Variant soils are on the lower, more sloping parts of the pediment slopes and along the dissected drainageways. Mapped areas are irregularly shaped and are 1,000 to 2,500 acres in size. Individual areas of each soil are 40 to 75 acres in size.

The Pena soils make up about 50 percent of the association. Typically, the surface layer is dark grayish brown loam about 7 inches thick. The next layer is brown gravelly loam about 9 inches thick. The substratum is very pale brown very gravelly loam to a depth of more than 60 inches.

These soils are moderately calcareous in the surface layer and strongly calcareous in the substratum. They are moderately alkaline. Permeability is moderate, and available water capacity is low.

The Aztec Variant soils make up about 15 percent of the association. Typically, a desert pavement of about 5 percent cobbles and 95 percent gravel covers the surface. The surface layer is pale brown gravelly fine sandy loam about 8 inches thick. The upper 23 inches of the substratum is very pale brown very gravelly sandy loam that is high in gypsum. Below that, the substratum is very pale brown very gravelly sandy loam to a depth of more than 60 inches.

These soils are calcareous throughout and are moderately alkaline. Permeability is moderately rapid below a depth of 30 inches, and available water capacity is low.

Included in mapping are small intermingled areas of Gypsum land generally near the Aztec Variant soils. These areas of exposed gypsum have a desert pavement. Also included are small intermingled areas of Shanta and Gabaldon soils and alluvial soils. These soils are adjacent to perennial and intermittent stream channels on bottom land and in depressions. A few small areas of gravelly soils are on the terraces above the flood plain. These soils formed in mixed alluvium weathered from limestone and gypsiferous material. These inclusions make up 35 percent of this association. Individual areas of these soils are smaller than 15 acres.

The potential for grazing is moderate. Grazing management should maintain or improve the plant cover, let litter accumulate, and prevent accelerated soil erosion. These soils are fragile and erode rapidly if the plant cover is removed.

Grazing should be managed to increase the production and reproduction of the desirable grasses such as alkali sacaton, plains lovegrass, sideoats grama, black grama, and New Mexico feathergrass, a variety of palatable forbs, and shrubs such as winterfat and fourwing saltbush. Periodically deferring grazing during the summer growing season, July through September, improves the vigor and reproduction of the warm season grasses such as sideoats grama and black grama. Spring rest from grazing encourages the growth of forbs and reproduction of the cool-season grasses such as New Mexico feathergrass. Fall and winter rest is beneficial to shrubs. Varying the seasons of grazing and rest from year to year maintains a balanced plant community that provides high quality forage all year. Continuous year-long grazing results in a plant community dominated by oneseed juniper, agave, algerita, wooly groundsel, tridens, threeawn, and fluffgrass. Range in this condition is of little value for grazing and is subject to accelerated soil erosion. Stocking rates should be carefully balanced with forage production.

Mechanical range seeding is not feasible on most of this association because of slope. Selective mechanical brush management is preferable to chemical, because it preserves many beneficial plants. Practices used for intensive grazing management, such as fencing, underground pipelines, and livestock watering facilities, are difficult and costly to install because of steepness of slope and dissection of the landscape by many drainageways. Gypsum in the Aztec Variant soils corrodes steel pipelines. These structures must be carefully planned onsite. Earthen dams and ponds should be placed on included Shanta soils and similar soils adjacent to drainageways in depressional areas. Because of the slopes and the variety of vegetation, the forage produced on this association can be most efficiently used by combinations of goats, sheep, and cattle.

This association has very low potential for irrigated crops. Some areas of included soils in bottom lands are suitable for some types of farming and are being used for small orchards and irrigated pasture where the areas are large enough. Most of the bottom lands are too narrow and the areas of suitable soil are too small for irrigation to be feasible.

This association has moderate potential for wildlife habitat. These soils produce native plants that provide food and cover for scaled, harlequin, and Gambel quail and wild turkey.

This association has moderate potential for urban development. Slope limits construction of roads and streets. This can be overcome by selecting areas that are less sloping. The gravelly substratum of these soils limits some types of excavation. Corrosion of underground utilities is a severe limitation, but the use of noncorrodible materials eliminates this problem. The high content of gypsum in the Aztec Variant soils creates a problem for almost all types of construction. Formation of pits as gypsum dissolves and instability of gypsiferous material are the major limitations. Onsite investigation, careful selection of foundation material, and good design and careful installation help to overcome the problems caused by gypsum.

PCB—Pena-Cale-Kerrick association, nearly level. This association consists of areas of deep and moderately deep, well drained soils. These soils occur in a regular and repeating pattern in broad upland valleys dissected by narrow, sometimes deep drainageways that meander across the unit. The Pena soils are on the sides of drainageways, and the Cale and Kerrick soils are on the nondissected part of the upland valley floor above and between the drainageways. These soils formed in highly calcareous, medium textured alluvium derived from limestone. Individual areas of each soil are about 50 to 250 acres in size.

The deep Pena soils make up about 35 percent of the association. Typically, the surface layer is dark grayish brown silty clay loam about 9 inches thick. The next layer is brown gravelly clay loam about 5 inches thick. The substratum is white very gravelly silt loam to a depth of more than 60 inches. The lime content of this layer is very high.

These soils are strongly calcareous and moderately alkaline. Permeability is moderate, and available water capacity is low.

The deep Cale soils make up about 30 percent of the association. Typically, the surface layer is dark grayish brown silt loam about 6 inches thick. The subsoil is about 39 inches thick. The upper part of the subsoil is grayish brown silt loam, and the lower part is grayish brown silty clay loam and brown clay loam. The substratum is light brown loam to a depth of more than 60 inches.

These soils are moderately calcareous in the surface layer and strongly calcareous below. They are mildly alkaline to moderately alkaline. Permeability is moderately slow, and available water capacity is high.

The moderately deep Kerrick soils make up about 15 percent of the association. Typically, the surface layer is brown silt loam about 9 inches thick. The subsoil is 16 inches thick. The upper part of the subsoil is brown silt loam, and the lower part is pale brown clay loam. Indurated caliche is at a depth of 25 inches.

These soils are moderately calcareous throughout and are moderately alkaline. Permeability is moderate, and available water capacity is low.

Included in mapping are a few areas of Ector and Deama soils adjacent to the limestone hills. Also included are some areas of soils that are similar to Kerrick

soils but that have indurated caliche above a depth of 20 inches and some areas of soils that are similar to Cale soils but that have, below a depth of 40 inches, a layer that is high in lime. These soils are associated with Cale and Kerrick soils. Also included are areas of deep and shallow, dark colored soils and small areas of gravelly riverwash in the drainageways and small depressional areas. The included soils make up about 20 percent of the association.

Most areas of this association are used for grazing and wildlife habitat.

Most parts of this unit have good potential for grazing. Grazing management should improve or maintain the plant cover, let litter accumulate, and prevent accelerated soil erosion.

Grazing should be managed to increase the production and reproduction of the desirable grasses, such as sideoats grama, black grama, vine-mesquite, western wheatgrass, green needlegrass, and a variety of palatable forbs and shrubs such as winterfat, Bigelow sagebrush, and fourwing saltbush. Periodically deferring grazing during the summer growing season, July through September, improves the vigor and reproduction of the warm-season grasses such as sideoats grama, black grama, and vine-mesquite. Spring rest from grazing encourages growth of the forbs and reproduction of the cool-season grasses such as western wheatgrass and green needlegrass. Fall and winter rest is beneficial to shrubs. Changing the seasons of grazing and rest from year to year maintains a variety of vegetation that provides high quality forage all year. Continuous year-long grazing results in a plant community of oneseed juniper, pinyon pine, algerita, cholla, pricklypear, yucca, red muhly, and creeping muhly (fig. 7). Range in this condition is of little value for grazing and is subject to accelerated soil erosion.

The Cale and Pena soils, and to a lesser degree the Kerrick soils, are all suitable for mechanical range seeding. Adapted species include improved varieties of little bluestem, sideoats grama, western wheatgrass, spike muhly, blue grama, and black grama. Mechanical dozing, root-cutting, and stacking of juniper and cholla is practical and reduces competition for sunlight and water with forage species. Stacks of brush enhance quail habitat. The spread of yucca can be checked by letting cows graze while it is in flower in May and June. This soil is suitable for intensive grazing management that includes fencing, underground pipelines, and livestock watering facilities. Lack of well water in this area limits grazing to periods when pond water is available. All of the soils are suitable for raintraps and artificial water catchments. Ponds should be placed on the Cale soils or on included deeper soils in the drainageways. Because of the great variety of vegetation on this association, the forage can be most efficiently used by combinations of cattle, sheep, and goats.

This association has low potential for woodland. However, sparse stands of pinyon pine and oneseed juniper grow in most areas.

This association has moderate potential for wildlife habitat. These soils produce native plants that provide food and cover for scaled and harlequin quail and wild turkey.

This association has low potential for irrigation. Lack of irrigation water, depth to the indurated layer in the Kerrick soils, and gravel content of the Pena soils limit irrigated farming.

This association has moderate to low potential for most urban uses. Depth to the indurated layer in the Kerrick soils and gravel content of the Pena soils are limitations.

PDF—Pena Variant-Rock outcrop association, steep. This association consists of areas of deep, well drained soils and igneous outcrop. These areas occur in a regular and repeating pattern on steep and very steep mountain crests and sides, on narrow winding tops, on nearly vertical escarpment fronts, and in narrow drainageways (see cover). The Pena Variant soils are generally on the west-facing side slopes and some crests. Rock outcrop occurs as escarpments, ledges, and talus slopes throughout the unit and as a major escarpment on the south and west sides of the area. The soils formed in material weathered from volcanic rocks, primarily andesite, latite, rhyolite, and associated tuff and ash of the Sierra Blanca Series. Individual areas of each part are 5 to 50 acres in size.

The Pena Variant soils make up about 60 percent of the association. Typically, the surface layer is dark grayish brown loam about 12 inches thick. The subsoil is brown very gravelly loam about 13 inches thick. The substratum is pale brown extremely gravelly sandy loam to a depth of more than 60 inches. Gravel makes up about 10 percent of the surface layer, 40 percent of the subsoil, and 70 percent of the substratum. The substratum contains some gypsum on the surfaces of rock fragments.

These soils are strongly calcareous and moderately alkaline throughout. Permeability is moderate, and available water capacity is moderate.

Rock outcrop makes up about 25 percent of the association. It occurs as escarpments, rock bluffs, talus slopes, ledges, and boulders throughout the area. The rock is volcanic, primarily andesite, latite, and rhyolite. It weathers quite readily on the north- and east-facing side slopes and forms the major escarpments and bluffs on the west- and south-facing side slopes.

Since runoff from Rock outcrop is rapid, excess water pours onto the surrounding soils. This causes erosion during the intense storms of summer. Most of the rock is basic, but there are a few dikes and sills of acid intrusive rock.

Included in mapping are a few areas of gravelly loam soils that are about 4 to 20 inches deep over bedrock. These soils are primarily on the escarpment caps and ridge crests. Also included are some areas of Gypsum land and associated thin gravelly fine sandy loam soils on the lower foothills and pediments. Gravelly and cobbly arroyo bottoms dissect the unit. These inclusions make up about 15 percent of the association.

This association is used for grazing and wildlife habitat, and to a limited extent by a military observation post. The potential for grazing is moderate. Grazing management should maintain or improve the plant cover, let litter accumulate, and prevent accelerated soil erosion.

Grazing should be managed to increase the production and reproduction of the desirable warm-season grasses such as black grama and sideoats grama and a variety of palatable forbs on the Pena Variant soils. Periodically deferring grazing during the summer growing season, June through September, improves the vigor and reproduction of the grasses. Spring rest from grazing encourages the forbs, and fall and winter rest is beneficial to shrubs. Varying the seasons of grazing and rest from year to year maintains a balanced plant community that provides high quality forage all year. Continuous yearlong grazing results in a plant community dominated by catclaw, various cacti, and fluffgrass. Range in this condition is of little value for grazing and is subject to accelerated soil erosion.

Mechanical range seeding is not feasible on this association because of steep slopes and Rock outcrop. Practices involved in intensive grazing management, such as fencing, underground pipelines, and livestock watering facilities are difficult to install because of Rock outcrop and boulders on the surface. A few wells are located in the lower lying parts of this unit adjacent to the gravelly bottom land in arroyos that dissect the unit. Properly installed pipelines can distribute livestock water along the drainageways. Earthen tanks are not suitable because the soils are porous and gravelly. Livestock can be encouraged to use the higher lying areas by placing salt and supplemental feed there. Because of the variety of vegetation and steep slopes, the forage produced by these soils is most efficiently used by combinations of sheep, goats, and cattle.

The potential for wildlife habitat is moderate. These soils produce native plants that provide food and cover for scaled and Gambel quail, mourning and white-winged dove, mountain lion, mule deer, white-tailed deer, and desert bighorn.

The potential for urban use or farming is low to very low. The steep slopes and Rock outcrop severely limit urban use and farming.

PEC—Philder very fine sandy loam, 0 to 9 percent slopes. This well drained, calcareous soil is on nearly level to gently rolling, rock-controlled uplands. The soil is shallow over caliche. The landscape is mainly broad, partially dissected very old surfaces and low rolling hills. The soil formed in eolian and upland alluvial sediments. The original indurated caliche has been fractured, but recementation has taken place in the upper 6 to 8 inches. The mapped areas are broad and somewhat elongated and are 1,000 to 5,000 acres in size.

Typically, the surface layer is brown very fine sandy loam about 4 inches thick. The subsoil is about 8 inches thick. The upper part of the subsoil is brown sandy clay loam, and the lower part is pale brown gravelly sandy clay loam and contains about 30 percent indurated caliche fragments. The upper 6 inches of the substratum is pale brown extremely gravelly silt loam and contains 85 percent coarse fragments of indurated caliche. The next 11 inches is extremely hard, carbonate-cemented material. Below that, the substratum to a depth of more than 60 inches is white very gravelly silt loam that contains 55 percent coarse fragments.

Included with this soil in mapping are areas of Reyab soils in narrow drainageways, Tencee soils on a few south-facing side slopes, Armesa soils on deeper side slopes, and Rock outcrop and Tencee soils on some ridge crests. These inclusions make up about 15 percent of any mapped area. Individual areas of these soils are generally smaller than 20 acres.

This soil is slightly to strongly calcareous and mildly alkaline to moderately alkaline. Permeability is moderate. Available water capacity is very low, but since the indurated caliche is at a depth of less than 20 inches, water is held up on this contact and is available to many plants.

Most areas of this soil are used for grazing or wildlife habitat. Some areas are in a military reservation and are used for missile impact sites.

This soil has high potential for grazing during years of favorable rainfall. Grazing management should maintain the plant cover, let litter accumulate, and prevent accelerated wind and water erosion.

Grazing should be managed to maintain the cover of black grama, which is dominant, while encouraging increased production of a variety of other grasses and forbs. Deferring grazing during July, August, and September in one year out of four permits black grama and bush muhly to maintain vigor and to reproduce. Spring deferment encourages the forbs and greatly enhances the cattle's diet in spring. Fall and winter deferment benefits the production and reproduction of browse species such as fourwing saltbush, winterfat, and Mormon-tea, which livestock relish in winter. Changing the season of grazing and rest from year to year maintains a balanced plant community that provides forage all year. Continuous year-long grazing produces a cover predominantly of black grama that eventually yields to low value plants such as threeawn, sand dropseed, yucca, and creosotebush. This leaves the soil subject to wind erosion. The spread of small soapweed yucca can be controlled by

letting cows graze in May or June when the plants are in flower.

Range seeding is only marginally successful on this soil in most years, except in the extreme eastern part of the survey area, where the probability that the soil will receive enough precipitation within the needed period for establishment of seedlings is small. The hard lime layer at a shallow depth makes this soil unsuitable for earthen ponds. Suitable sites for ponds can be found on the included Reyab soils. The hard lime layer also makes constructing fences and burying livestock pipelines difficult.

This soil has moderate potential for wildlife habitat. This soil produces native plants that provide food and cover for scaled quail, mourning and white-winged dove, pronghorn antelope, and mule deer. Maintaining a proper balance between shrubs, forbs, and grasses for food and cover is important in managing this soil for wildlife habitat. Water for wildlife is available and is most easily developed on the included Reyab soils.

The shallow soil depth and hard lime layer limit underground pipelines and stock water tanks. The lime layer can be ripped with extreme difficulty. The rubble then must be removed and the soil backfilled to keep the pipe from being crushed.

The potential for farming is low because the soil is shallow, but the potential is moderate for irrigated pasture. Lack of water is the main limitation. Livestock water is also limited. Most water storage facilities are on the included Reyab soils.

The potential for urban use is low because of location.

PFB—Philder-Armesa association, undulating. This association consists of areas of well drained soils. The soils are shallow over caliche or are deep. These soils occur in a regular and repeating pattern on gently undulating uplands and in some narrow drainageways. The Philder soils are on the more sloping side slopes, and the Armesa soils are in the more gently sloping parts of the landscape. These soils formed in calcareous eolian material and upland alluvium derived from limestone. Mapped areas are mostly wide and irregularly shaped and are 200 to 1,000 acres in size. Individual areas of each soil are 100 to 500 acres.

The shallow Philder soils make up about 45 percent of the association. Typically, the surface layer is brown very fine sandy loam about 4 inches thick. The subsoil is brown sandy clay loam about 8 inches thick. The upper 6 inches of the substratum is pale brown very gravelly silt loam. The next 11 inches is an extremely hard layer of carbonate-cemented material that completely restricts water movement and root penetration. Below that, the substratum is white very gravelly silt loam to a depth of more than 60 inches.

These soils are strongly calcareous and moderately alkaline. Permeablity is moderate, and available water capacity is very low.

The deep Armesa soils make up about 40 percent of this association. Typically, the surface layer is brown very fine sandy loam about 3 inches thick. The subsoil is brown silt loam about 15 inches thick. The substratum to a depth of more than 60 inches is white silt loam that is high in lime. Gravel strata or lenses of sandy loam are common below a depth of 60 inches.

These soils are strongly calcareous throughout and are moderately alkaline. Permeability is moderate, and available water capacity is high.

Included in mapping are a few areas of deep Reyab and Tome soils. These soils are in small, narrow, scattered drainageways. Also included are areas of Tencee and Lozier soils, generally near limestone outcrops. These included soils make up 15 percent of this association. Individual areas of these soils are about 10 to 20 acres in size.

This association is used for grazing, wildlife habitat, and watershed. Because most areas are in the military reservation, use is restricted to grazing and wildlife habitat.

The potential for grazing is high. Grazing management should maintain the plant cover, let litter accumulate, and prevent accelerated soil erosion.

Grazing should be managed to maintain the cover of black grama, which is dominant, while encouraging increased production of a variety of other grasses and forbs. Deferring grazing during July, August, and September in one year out of four permits the black grama, bush muhly, plains bristlegrass, and vine-mesquite to maintain vigor and to reproduce. Spring deferment encourages the forbs which greatly enhance the cattle's diet in spring. Fall and winter rest from grazing benefits the production and reproduction of browse species such as fourwing saltbush, winterfat, and Mormon-tea, which livestock relish in winter. Changing the seasons of grazing and rest from year to year maintains a balanced plant community that provides quality forage all year. Continuous grazing results in a deteriorated plant community.

Range seeding is only marginally successful on these soils. Reliable precipitation data are not available. Seeding is more feasible on the deeper Armesa soils than on the Philder soils. Practices such as pipelines, earthen ponds, and fencing are not practical on the Philder soils because of the thick, hard lime layer at a shallow depth. These practices can be applied on the Armesa soils. Earthen ponds should be placed in the deeper soils in the small drainageways scattered throughout this association.

This association has moderate potential for wildlife habitat. These soils produce native plants that provide food and cover for scaled quail, mourning and white-winged dove, pronghorn antelope, and mule deer.

Developing available water and maintaining a balanced community of shrubs, forbs, and grasses for cover and food is important in managing this association for a variety of wildlife.

Moderate shrink-swell potential and low strength limit use of the Armesa soils for urban development.

If irrigation water were available, the Armesa soils would have moderate potential for farming.

PGB—Pintura-Dona Ana complex, 0 to 5 percent slopes. This complex consists of large areas of deep, well drained and somewhat excessively drained soils. These soils are so intermingled that they could not be separated on the low detail map. This complex is on nearly level to undulating, medium textured and coarse textured dunes and the areas between the dunes (fig. 8). Slope on the sides of the coppice dunes is as steep as 80 percent or more. The Pintura soil is on the partly stabilized coppice dunes, and the Dona Ana soil is between the dunes. The soils formed in medium textured to coarse textured eolian material and local alluvial sediment. Mapped areas are wide and somewhat elongated and are 15,000 to 25,000 acres in size. A few irregularly shaped areas are smaller than 1,000 acres.

The somewhat excessively drained Pintura loamy fine sand makes up about 45 percent of each mapped area. Typically, the surface layer is light reddish brown loamy fine sand about 12 inches thick. The substratum is light reddish brown fine sand and loamy fine sand to a depth of more than 60 inches.

This soil is slightly calcareous and mildly alkaline throughout. Permeability is rapid, and available water capacity is low.

The well drained Dona Ana fine sandy loam makes up about 35 percent of each mapped area. Typically, the surface layer is reddish brown fine sandy loam about 3 inches thick. The subsoil is reddish brown sandy clay loam about 18 inches thick. The substratum is pinkish gray sandy clay loam and light reddish brown sandy loam to a depth of more than 60 inches.

This soil is strongly calcareous and moderately alkaline throughout. Permeability is moderate, and available water capacity is high.

Included with this complex in mapping are small areas of Berino and Onite soils in depressional areas between the dunes. Also included are areas of Bluepoint soils on the sides of some dunes and small stabilized pockets throughout the area, small areas of Mimbres soils in old relic playa lake bottoms, and Holloman soils on the northern fringe of mapped areas. These soils formed in coarse and medium textured eolian and alluvial sediment. These soils make up about 20 percent of this complex.

The potential for grazing is low. Grazing management should improve or maintain the plant cover, let litter accumulate, and prevent accelerated soil erosion.

Grazing should be managed to increase the production and reproduction of the desirable warm-season grasses such as black grama, bush muhly, plains bristlegrass, and giant dropseed; forbs such as globemallow, croton, and blanketflower; and shrubs such as Mormon-tea and fourwing saltbush. Periodically deferring grazing during the summer growing season, June through September, improves the vigor and reproduction of the grasses. Spring rest from grazing encourages the forbs, and fall and winter rest benefits shrubs. The previous year's growth should be left standing during the windy season, February through May, to prevent excessive wind erosion. Varying the seasons of grazing and rest from year to year maintains a balanced plant community that provides quality forage all year. Continuous year-long grazing results in a plant community dominated by mesquite, sand sagebrush, yucca, American tarbush, broom snakeweed, and threeawn. Range in this condition is of little value for grazing and is subject to accelerated wind erosion.

Mechanical range seeding is not feasible on this complex because of the small probability that the area will receive enough precipitation for establishment of seedlings. Chemical brush management is preferable to mechanical because of the difficulty of establishing new vegetation on disturbed ground. The spread of yucca can be checked by letting cows graze while the plants are in flower in May and June. Intensive grazing management that includes fencing, underground plastic pipelines, and livestock watering facilities is feasible. Earthen pit tanks can be constructed satisfactorily on the included Mimbres soils.

The forage and browse produced on this complex is coarse and is most efficiently used by mature cows.

This complex has low to moderate potential for wildlife habitat. These soils produce native plants that provide food and cover for scaled and Gambel quail, mourning and white-winged dove, and pronghorn antelope.

This complex has low potential for farming. Low available water capacity and droughtiness can be overcome by frequent irrigation. Only drip or sprinkler systems are suitable. The wind erosion hazard is very severe if these soils are cultivated.

PHB—Pintura-Tome-Dona Ana complex, 0 to 5 percent slopes. This complex consists of small to medium-sized areas of deep, somewhat excessively drained and well drained soils. These soils are so intermingled that they could not be separated on the low detail map. This complex is on large, eroding sand dunes with steep sides, on relic lake beds underlain by gypsiferous lacustrine sediment, and in areas of medium textured material between dunes. The Pintura soil is on the dunes, the Tome soil is on the old relic lake beds, and the Dona Ana soil is between the dunes. Mapped areas are irregularly shaped and are 600 to 6,000 acres in size. Individual areas of each part range from a fraction of an acre of Pintura soil to as much as 50 acres of Tome soil.

The somewhat excessively drained Pintura loamy fine sand makes up about 30 percent of each mapped area. Typically, the surface layer is light reddish brown loamy fine sand about 12 inches thick. The substratum is light

reddish brown fine sand and loamy fine sand to a depth of more than 60 inches.

This soil is slightly calcareous and mildly alkaline to moderately alkaline throughout. Permeability is rapid, and available water capacity is low.

The well drained Tome very fine sandy loam makes up about 25 percent of each mapped area. Typically, the surface layer is pale brown very fine sandy loam about 5 inches thick. The next layer is pale brown silt loam about 9 inches thick. The substratum is pale brown silty clay loam to a depth of 40 inches. Below that, the substratum is highly stratified, gypsiferous lake bed sediment.

This soil is moderately to strongly calcareous and moderately alkaline throughout. Permeability is moderately slow, and available water capacity is high.

The well drained Dona Ana fine sandy loam makes up about 20 percent of each mapped area. Typically, the surface layer is reddish brown fine sandy loam about 3 inches thick. The subsoil is reddish brown sandy clay loam about 18 inches thick. The substratum is pinkish gray sandy clay loam and light reddish brown sandy loam to a depth of more than 60 inches.

This soil is strongly calcareous and moderately alkaline throughout. Permeablity is moderate, and available water capacity is high.

Included with this complex in mapping are small areas of Holloman soils contiguous to the playa lakes in areas where gypsum is near the surface. Also included are small areas of Wink and Berino soils in the more gently sloping areas contiguous to the Dona Ana soil and areas of Bluepoint soils on coppice dunes. These soils make up 25 percent of this complex.

The potential of this complex for grazing is moderate. Grazing management should improve or maintain the plant cover, let litter accumulate, and prevent accelerated soil erosion.

Grazing should be managed to increase the production and reproduction of the desirable warm-season grasses such as black grama, bush muhly, plains bristlegrass, and giant dropseed; forbs such as globemallow, croton, and blanketflower; and shrubs such as winterfat, fourwing saltbush, and Mormon-tea. Periodically deferring grazing during the summer growing season, June through September, improves the vigor and reproduction of the grasses. Spring rest from grazing encourages the forbs, and fall and winter rest is beneficial to shrubs. The previous year's growth should be left standing during the windy season, February through May, to prevent excessive wind erosion. Varying the seasons of grazing and rest from year to year maintains a balanced plant community that provides high quality forage all year. Continuous year-long grazing results in a plant community dominated by mesquite, sand sagebrush, yucca, broom snakeweed, threeawn, burrograss, and annual weeds. Range in this condition is of little value for grazing and is subject to accelerated wind erosion.

Mechanical range seeding is not feasible on this complex because of the small probabilitiy that the area will receive enough precipitation for establishment of seedlings. Chemical brush management is preferable to mechanical because of the difficulty of establishing new vegetation on disturbed ground. The spread of yucca can be checked by letting cows graze while it is in flower in May and June. Intensive grazing management that includes fencing, underground plastic pipelines, and livestock watering facilities is feasible throughout the complex. Earthen pit tanks can be constructed on the Tome and Dona Ana soils after onsite investigation to locate and avoid layers of gypsum or coarse sand. Most of the forage and browse produced on this complex is coarse and is most efficiently used by mature cows.

Since most areas of this complex are on military land, use is restricted. There are few limitations for such uses as buildings and roads. The hazard of wind erosion is the most severe limitation for any type of construction that disturbs the surface. If buildings are constructed, lawns are difficult to establish unless the soil is seeded, mulched, and irrigated as soon as possible after the surface is disturbed. The mulch should be maintained until a plant cover is established. Windbreaks should be planted as soon as possible after a site is disturbed; however, they take several years to become established and much damage can occur unless other precautions are taken. The shoulders of roads should also be seeded, mulched, and watered until a plant cover is established. The Dona Ana and Tome soils are moderately limited for buildings and roads by the shrink-swell potential of the soils. Good design and good foundation material easily overcome this limitation.

The potential for wildlife habitat is moderate to high. These soils produce native plants that provide food and cover for scaled and Gambel quail, mourning and white-winged dove, pronghorn antelope, and mule deer.

This complex is not suitable for farming because it has very severe hazard of wind erosion if the plant cover is removed.

POB—Prelo silt loam, 0 to 3 percent slopes. This deep, well drained soil is on broad flood plains and lower parts of alluvial fans and pediments terminating on the basin floor. Slopes are smooth and level or slightly concave. Some areas have hummocks 1 to 3 feet high. Slope of the hummocks is 20 to 80 percent, and they make up about 10 percent of the area of some delineations. Individual areas are 1,200 to 2,500 acres in size.

Typically, the surface layer is reddish brown silt loam and silty clay loam about 8 inches thick. The subsoil is reddish brown silty clay loam about 24 inches thick. The lower part contains a few crystals and soft masses of gypsum. The substratum is reddish brown silty clay loam to a depth of more than 60 inches. It contains gypsum crystals, masses, and nodules.

Included with this soil in mapping are areas of Largo, Alamogordo, Tome, and Mimbres soils. These soils make up about 15 percent of each delineation. Also included are some areas of exposed gypsum. Individual areas of these soils are 0.5 to 30 acres in size.

This soil is moderately calcareous to strongly calcareous and moderately alkaline. Permeability is moderately slow, and available water capacity is high.

This soil is used extensively for irrigated crops and pasture, urban development, and grazing.

The potential for grazing is moderate to high. Grazing management should maintain or improve the plant cover, let litter accumulate, and prevent accelerated soil erosion.

Grazing should be managed to increase the production and reproduction of the desirable warm-season grasses, such as alkali sacaton, tobosa, twoflower trichloris, and bush muhly, and a variety of palatable forbs. Periodically deferring grazing during the summer growing season, June through September, improves the vigor and reproduction of the grasses. This period is also the most opportune time to graze tobosa intensively for maximum use while it is green and growing. Spring rest from grazing encourages the forbs, and fall and winter rest is beneficial to shrubs. Varying the seasons of grazing and rest from year to year maintains a balanced plant community that provides high quality forage all year. Continuous year-long grazing results in a plant community dominated by mesquite, creosotebush, tarbush, condalia, yucca, threeawn, burrograss, and fluffgrass. Range in this condition is of little value for grazing and is subject to accelerated soil erosion.

Mechanical range seeding is not feasible on this soil because of the small probability that the area will receive enough precipitation for establishment of seedlings. Chemical brush management is preferable to mechanical because of the difficulty of establishing new vegetation on disturbed ground. The spread of yucca can be checked by letting cows graze while it is in flower in May and June. Intensive grazing management that includes fencing, underground plastic pipelines, and livestock watering facilities is feasible on this soil. Earthen dams and ponds can be constructed but quickly fill with sediment.

Much of this area has undergone urbanization and more is being subdivided into single dwelling lots and ranchettes 5 to 20 acres in size. Small areas of this soil receive overflow from surrounding areas. If these areas are not protected, the flooding restricts development. In protecting the areas, the water should not be diverted onto areas where it will cause erosion. Moderately slow permeablity limits septic tank filter fields. They must be made larger to properly dispose of effluent. Many filter fields should not be concentrated in a small area, because saturation of the surface layer creates health hazards and may cause slippage around foundations. The shrink-swell potential is moderate and can be overcome by proper design.

The potential for wildlife habitat is high. This soil produces native plants that provide food and cover for scaled and Gambel quail and mourning and white-winged dove.

The potential for farming is high to moderate. The gypsum in the substratum affects available water capacity and causes the substratum to be saline. Deep-rooted crops can be grown if they are adapted to salinity. Grasses and cereal grains can be grown easily. Sprinkler systems for irrigation conserve water but can cause a build-up of surface salts if the soil is underirrigated. Alfalfa does well on this soil but can be affected by the gypsum, which varies in concentration with depth. The gypsum content ranges from 5 to 15 percent.

RAB—Reakor-Tome-Tencee association, gently sloping. This association consists of areas of deep and shallow, well drained soils. These soils occur in a regular and repeating pattern in narrow to wide alluvial valleys and on lower parts of side slopes of pediments. The Reakor soils are on the edges of alluvial bottom land. The Tome soils are on the center and more level parts of the alluvial bottom land. The Tencee soils are on the pediment side slopes. These soils formed in highly calcareous sediment derived from limestone. Mapped areas conform to the shape of the valley and are elongated and oriented with the drainage pattern. They are 150 acres to more than 5,000 acres in size. Individual areas of each soil are 40 to 150 acres in size, but since they are elongated they may be in very narrow bands.

The deep Reakor soils make up about 35 percent of the association. Typically, the surface layer is light brownish gray silt loam about 4 inches thick. The subsoil is pale brown silt loam about 24 inches thick. The substratum is white silt loam to a depth of more than 60 inches. In some areas the profile contains more than 15 percent hard carbonate nodules.

These soils are moderately alkaline and strongly calcareous throughout. Permeability is moderate, and available water capacity is high.

The deep Tome soils make up about 30 percent of this association. Typically, the surface layer is pale brown silt loam about 6 inches thick. Below that, the soil to a depth of more than 60 inches is pale brown, weakly stratified silt loam and thin lenses of very fine sandy loam and some segregations of soft lime.

These soils are calcareous throughout and moderately alkaline. Permeability is moderately slow, and available water capacity is high.

The shallow Tencee soils make up about 20 percent of this association. Typically, the upper 15 inches of the soil is light brownish gray and very pale brown very gravelly sandy loam that is 45 to 65 percent gravel. The next 10 inches is an indurated lime layer that is impervious to roots and water. Below that, the substratum is white extremely cobbly loam to a depth of more than 60 inches.

These soils are strongly calcareous throughout and moderately alkaline. Permeability is moderate, and available water capacity is very low. These soils are normally drier than the other soils in the association. Because these soils slope more strongly than the other soils, water runs off them.

Included in mapping are a few areas of Lozier soils and soils that are similar to Tencee soils but that have indurated caliche at a depth of 30 inches. These soils are intermixed with Tencee soils in the steeper parts of the area. Also included are areas of deep, very gravelly soils near the drainageways and riverwash in the wider drainageways. The included soils make up about 15 percent of this association.

Most areas of this association are used for grazing and wildlife habitat.

Some areas have moderate potential for grazing, but other areas have degraded to poor potential and only sparse stands of creosotebush. Grazing management should maintain the plant cover, let litter accumulate, and prevent accelerated soil erosion.

Grazing should be managed to increase the composition and production of the perennial warm-season grasses such as sideoats grama, black grama, and alkali sacaton. Winterfat is valuable browse for sheep and cattle in winter. Periodically deferring grazing during July, August, and September enables these grasses to improve in vigor and reproduction. Fall and winter rest is beneficial to winterfat. Grazing cattle in May and June when yucca is in flower helps to control the spread of yucca. The flower stalks are an important source of vitamin A and protein in spring before grasses begin to grow. The best improvement in vigor and composition is achieved by varying the season of grazing from year to year. Continuous year-long grazing results in stands dominated by creosotebush and American tarbush and subject to excessive soil erosion.

The Reakor and Tome soils are suitable for mechanical seeding, but the probability that the area will receive enough precipitation for establishment of seedlings is not dependable or predictable. In experiments, brush-infested range has been successfully rehabilitated by rootplowing, basin pitting, drilling, and brush mulching all in a single operation. The Reakor and Tome soils are suitable for fencing, pipelines, and watering facilities for improved grazing management. Burning in late winter and early spring reduces brush and improves the composition of forage. The shallow Tencee soils are not suitable for mechanical manipulation, fencing, livestock pipelines, or watering facilities.

The Reakor and Tome soils have high potential for irrigated crops and irrigated pasture. The limiting factor is the availabiliy of water. If a cheap source of water is found, these soils will produce quite well. Also, since much of this association is on State and Federal land, use is restricted. The Tencee soils are not suitable for farming because they are shallow and very gravelly.

The potential for wildlife habitat is low. These soils produce native plants that provide food and cover for scaled and Gambel quail, mourning and white-winged dove, and pronghorn antelope. Maintaining a balanced community of shrubs, perennial and annual grasses, and forbs for food and cover is important in managing this association for wildlife habitat.

Because of its location, this association has low potential for urban use. The Reakor soils have no severe limitation for most urban uses. The Tencee soils are severely limited for most urban and other uses because they are very gravelly and have an indurated lime layer at a depth of 15 inches. The Tome soils are subject to infrequent overflow from surrounding soils. Homesites, roads, and other structures should be protected from this flooding.

REB—Reeves Variant-Shanta association, gently sloping. This association consists of deep, well drained soils. These soils occur in a regular and repeating pattern on relic gently sloping alluvial pediments above the present valley floor (fig. 9). This area contains depressions, uplands, and narrow dissected drainageways. The Reeves Variant soils are primarily on the uplands, and the Shanta soils are in the depressions and lower terraces. These soils formed in both gypsiferous sediment and finer textured alluvium. The Shanta soils receive additional runon water from surrounding soils of the association. Mapped areas are irregular in shape and are 840 to 1,000 acres in size. Individual areas of each soil are 40 to 80 acres in size.

The Reeves Variant soils make up about 55 percent of the association. Typically, the surface layer is brown very fine sandy loam about 7 inches thick. The upper part of the subsoil is pale brown loam about 5 inches thick; the lower part is pink silt loam about 4 inches thick. The lower part contains a few segregations of gypsum. The upper 13 inches of the substratum is pink loam that is very high in gypsum. Below that, the substratum is light brown clay loam to a depth of more than 60 inches. Discontinuous cemented and laminated fragments of gypsum are in this part of the substratum, and gypsum content decreases with depth.

These soils are strongly calcareous and moderately alkaline. Permeability is moderate, and available water capacity is moderate to low.

The Shanta soils make up about 25 percent of this association. Typically, the surface layer is dark brown loam about 13 inches thick. The upper 14 inches of the substratum is dark brown silt loam. Below that, the substratum is brown sandy loam to a depth of more than 60 inches. The substratum is stratified with thin lenses of very fine sandy loam and clay loam.

These soils are noncalcareous in some part of the surface layer and calcareous throughout the lower layers. They are mildly alkaline to moderately alkaline.

Permeability is moderate, and available water capacity is moderate.

Included in mapping are a few areas of soils that have a strongly cemented gypsum layer. These soils make up about 18 percent of each mapped area. Very gravelly soils and bottom land in arroyos make up 2 percent of the association. Individual areas of these inclusions are generally smaller than 10 acres.

This association is used for grazing and wildlife habitat.

The potential for grazing is moderate to high. Grazing management should improve or maintain the plant cover, let litter accumulate, and prevent accelerated soil erosion.

Grazing should be managed to increase the production and reproduction of the desirable grasses such as sideoats grama, black grama, alkali sacaton, and bush muhly and a variety of palatable forbs and shrubs such as winterfat. Periodically deferring grazing during the summer growing season, July through September, improves the vigor of the warm-season grasses such as sideoats grama and permits them to reproduce. Spring rest from grazing encourages the forbs. Fall and winter rest is beneficial to shrubs such as winterfat. Varying the seasons of grazing and rest from year to year maintains a balanced plant community that provides high quality forage all year. Continuous year-long grazing results in a plant community dominated by mesquite, yucca, cacti, broom snakeweed, ring muhly, fluffgrass, and annuals. Range in this condition is of little value for grazing and is subject to accelerated soil erosion.

Mechanical range seeding is feasible throughout but is more successful on the Shanta soils. Adapted species include improved varieties of little bluestem, sideoats grama, and black grama. Grazing management that includes fencing, pipelines, livestock watering facilities, earthen ponds, and dams is suitable on the Shanta soils. Because of the corrosivity of the gypsiferous subsoil, underground pipelines and watering facilities in the Reeves Variant soils should be made of noncorrodible materials. Earthen dams and ponds are not well suited to the Reeves Variant soils because of the tendency of the gypsum to dissolve away. Mechanical rootcutting and stacking of cholla is feasible on both soils. The spread of yucca can be checked by letting cows graze in May and June while yucca is in flower.

The potential for wildlife habitat is moderate. These soils produce native plants that provide food and cover for scaled and Gambel quail, mourning and white-winged dove, band-tailed pigeons, mule deer, white-tailed deer, turkey, and bear.

The Shanta soils have no major limitation for farming, grazing, urban uses, or recreation. The Reeves Variant soils have a gypsiferous substratum. The gypsum limits earthen stock water tanks because of the tendency of gypsum to dissolve. It limits foundations because of low strength, and it is corrosive to steel pipe and concrete.

RFA—Reyab-Armesa association, gently sloping. This association consists of areas of deep, well drained soils. These soils occur in a regular and repeating pattern in depressional drainageways and on adjacent short pediments and alluvial fans. The nearly level Reyab soils are in the depressional drainageways, and the gently sloping Armesa soils are on the short pediments. These soils formed in calcareous eolian material and upland alluvial sediment derived primarily from limestone. Mapped areas are mostly long and narrow and are 200 to 1,000 acres in size. Individual areas of each soil are 20 to 300 acres.

The Reyab soils make up about 60 percent of the association. Typically, the surface layer is light gray loam about 4 inches thick. The subsoil is light gray and very pale brown silt loam about 21 inches thick. The substratum is very pale brown silt loam to a depth of more than 60 inches.

These soils are strongly calcareous throughout and moderately alkaline. Permeability is moderately slow, and available water capacity is high.

The Armesa soils make up about 35 percent of the association. Typically, the surface layer is brown very fine sandy loam about 3 inches thick. The subsoil is brown loam about 15 inches thick. The substratum to a depth of more than 60 inches is very pale brown silt loam that is high in lime. The substratum is massive but does not restrict penetration of roots.

These soils are strongly calcareous throughout and moderately alkaline. Permeability is moderate, and available water capacity is high. Some hard lenses of indurated caliche are in some parts of the substratum in places.

Included in mapping are a few areas of Philder soils, Lozier soils, and Rock outcrop. These inclusions are on the steeper side slopes. The Rock outcrop is bedded limestone. The inclusions make up 5 percent of this association. Individual areas are 2 to 10 acres in size.

All areas of this association are used for grazing and wildlife habitat. Because most areas of this association are on military reservations, use is restricted.

This association has high potential for grazing. Grazing management should maintain the plant cover, let litter accumulate, and prevent accelerated soil erosion.

Grazing on Reyab soils should be managed to increase the palatable, high producing grasses such as giant sacaton, alkali sacaton, cane bluestem, Arizona cottontop, twoflower trichloris, and white tridens. Some areas receive overflow water from adjoining areas. This water increases production and enables the soils to support a green vegetation during July, August, and September. Burning on these overflow areas in February and deferring grazing until summer every other year helps to remove coarse unused stalks and increases the palatability and useability of giant sacaton. The feasibility of burning depends on locating overflow areas large enough to be economical to fence and manage intensively. Laws, regulations, and precautions must be fol-

lowed when burning. Continouus year-long grazing results in a site dominated by American tarbush and low-value grasses. Range in this condition is subject to accelerated soil erosion and increased production of sediment.

Grazing on the Armesa soils should be managed to increase the composition, vigor, and production of black grama, blue grama, vine-mesquite, and sideoats grama as well as palatable forbs and browse. Periodically deferring grazing during the growing season, July through September, allows the grasses to improve in vigor and reproduction. Spring deferment is beneficial to the forbs, and fall and winter rest from grazing encourages vigor and reproduction of shrubs such as winterfat and fourwing saltbush. Varying the seasons of grazing and rest from year to year maintains a balanced plant community that provides quality forage all year.

Range seeding is only marginally successful on this association. Reliable precipitation records are not available. The soils are suitable for fencing, chemical and mechanical brush management, and livestock watering facilities. Earthen ponds for livestock and wildlife water should be placed on the Reyab soils in the drainageways. Livestock watering facilities using pipelines should be placed on the Armesa soils for better distribution of livestock and uniformity of grazing patterns.

The potential for wildlife habitat is moderate. These soils produce native plants that provide food and cover for scaled quail, mourning and white-winged dove, and pronghorn antelope. Maintaining a balanced community of shrubs, forbs, and grasses for food and cover and providing water are important in managing this association for wildlife habitat.

If irrigation water were available, the potential for row crops and pasture would be high. Since the military controls most of the area, uses other than military, grazing, or wildlife habitat are severely restricted.

ROG—Rock outcrop, 20 to 65 percent slopes. This low detail map unit is on steep and very steep mountainsides dissected by many drainageways. The rock is primarily intrusive igneous dikes and sills of rhyolite, syenite, and monzonite as individual mountain peaks or mesa sides in the Cornudas Mountains and intermixed with limestone in the Jarilla Mountains. Cornudas Mountain consists of huge boulders or rounded dikes of rhyolite and is unique to the area because of its unusual shape and composition. Mapped areas are 1,500 to 4,000 acres in size.

Included in mapping are small areas of Lozier and Tencee soils at the lower elevations near limestone hills and areas of shallow, very gravelly, dark colored soils in the Cornudas Mountains. These soils make up less than 20 percent of any mapped area. Individual areas of these soils are smaller than 1 acre. The mantle of loose soil material, sediment, and broken rock that overlies solid rock varies in thickness from less than 1 inch in the steep areas to about 10 inches in less sloping areas. Loose gravel and cobbles are common on all slopes.

Rock outcrop has no potential for urban use or farming because of the steep slopes and scattered pockets of thin soils. The only grazing is incidental use by goats and sheep in conjunction with adjacent areas. Because of the sparse vegetation and lack of water, regular grazing is not feasible.

The potential for wildlife habitat and esthetic use is high. Mule deer, scaled quail, various hawks, and many species of song birds and rodents are common. Bobcats, coyotes, and a few mountain lions also use these areas. Because vegetation is scarce, all browsing and grazing animals are in direct competition for existing forage. Management for wildlife habitat includes maintaining the existing shrubs, forbs, and grasses by excluding domestic livestock. Establishing wildlife watering areas and planting shrubs in favorable years increase the carrying capacity of the wildlife habitat.

RPG—Rock outcrop-Deama complex, 40 to 150 percent slopes. This complex consists of areas of very steep to extremely steep Rock outcrop and shallow, well drained soils on canyon sides. Elevation ranges from 4,500 to 5,500 feet. The soil formed in residuum derived from limestone.

Rock outcrop makes up about 60 percent of this complex. It is fractured limestone and dolomite. Some soil material is in the fractures.

Deama cobbly loam makes up 30 percent of this complex. Typically, the surface layer is brown cobbly loam about 4 inches thick. The substratum is dark grayish brown very gravelly clay loam about 10 inches thick. Fractured limestone bedrock is at a depth of 14 inches.

The effective rooting depth of this soil is less than 20 inches. Permeability is moderate, and available water capacity is very low. Surface runoff is high, and the erosion hazard is severe.

Included in mapping are small areas of Lozier and Pena soils. The Lozier soils are on ridgetops, and the Pena soils are on sides of drainageways. These included soils make up about 10 percent of the complex.

Management is limited by steep slopes and shallow soil depth. The natural vegetation on this complex is juniper-pinyon woodland with scattered live oak and an understory of grasses, forbs, and shrubs. The severe erosion hazard precludes management. This complex provides habitat for mule deer.

RRF—Rock outcrop-Lozier complex, 20 to 65 percent slopes. This complex consists of areas of Rock outcrop and shallow, well drained Lozier soil. These areas are so intermingled that they could not be separated on the low detail map. This complex is on steep sides of limestone-controlled hills. Mapped areas are narrow and elongated and are 640 to more than 4,000 acres in

size. Individual areas of each part are 10 to 20 acres in size.

Rock outcrop makes up about 50 percent of each mapped area. The outcrop is limestone bedrock in the form of cat-step escarpments or shelves. Some fracturing has occurred in the bedrock. Colluvium has accumulated at the base of some of the steeper slopes.

Runoff is rapid on Rock outcrop. Water flows onto the surrounding soils and accelerates erosion there.

The Lozier very gravelly loam makes up about 35 percent of each mapped area. Typically, the surface layer is light gray very gravelly silt loam and light brownish gray very gravelly loam about 7 inches thick. The substratum is white extremely gravelly silty clay loam that is high in lime. Limestone bedrock is at a depth of about 15 inches.

This soil is severely eroded in some areas and is only a thin mantle over limestone bedrock. Permeability is moderate, and available water capacity is very low.

Included with this complex in mapping are intermingled areas of Reakor, Tome, and Tencee soils generally smaller than 40 acres. The Reakor and Tome soils are primarily in or contiguous to the narrow drainageways. The Tencee soils are on the lower part of side slopes of pediments contiguous to the drainageways. Areas of Bluepoint soils occur in some mapped areas adjacent to playa lake beds in the western part of the survey area. These soils are more than 80 inches deep in some areas. In some areas severe erosion has taken place, leaving as much as 80 percent Rock outcrop and the rest a very thin mantle of soil. These areas are too small to separate on the low detail map. These areas are so severely degraded that even excluding livestock would do little to improve the condition. Inclusions make up about 15 percent of the complex.

This complex has moderate potential for grazing. Grazing management should maintain the plant cover and prevent erosion.

Rock outcrop does not support significant vegetation for livestock or large animals, but it sheds water onto adjacent soils increasing the effective moisture on the adjacent soils.

Grazing on the Lozier soil should be managed to improve composition and increase production of the warm-season perennial grasses such as black grama, sideoats grama, green sprangletop, and plains bristlegrass. Frequently deferring grazing during July, August, and September allows these grasses to improve in vigor and to reproduce.

The shallow soil depth and Rock outcrop limit the feasibility of fencing, pipelines, and water storage facilities to control distribution of livestock.

The potential for wildlife habitat is low to moderate. This complex produces native plants that provide food and cover for scaled quail, mourning dove, mule deer, and desert bighorn. Barbary sheep have been introduced on this unit.

This complex has very low potential for urban use or farming because of the shallow soil depth, Rock outcrop, and steep or very steep slopes.

RTE—Rock outcrop-Tortugas-Ustifluvents complex, 0 to 80 percent slopes. This complex consists of areas of gently sloping to extremely steep, shallow and deep, well drained soils and Rock outcrop on bottom land in canyons, benchlike canyon walls, and escarpments. Elevation ranges from 4,900 to 6,500 feet. The Tortugas soil has slopes of 5 to 40 percent, and the Ustifluvents have slopes of 0 to 15 percent. The Tortugas soil formed in residuum derived from interbedded sandstone, limestone, and dolomite. Ustifluvents formed in material weathered from mixed alluvium on bottom land in narrow canyons.

Rock outcrop makes up about 50 percent of this complex. It consists of benchlike canyon walls and ledges of interbedded sandstone, limestone, and dolomite. In places the bedrock is fractured enough that plant roots penetrate the cracks.

The shallow Tortugas very cobbly loam makes up 30 percent of this complex. Typically, the upper 4 inches of the surface layer is dark grayish brown very cobbly loam, and the lower 6 inches is dark grayish brown cobbly clay loam. Fractured limestone, dolomite, and sandstone bedrock is at a depth of 10 inches. Soil material is in the fractures.

Effective rooting depth of this soil is 20 inches or less. Some roots penetrate fractures in the bedrock. Permeability is moderate, and available water capacity is very low. The erosion hazard is severe.

The deep Ustifluvents make up 20 percent of the complex. They are variable. The surface layer is light brown, pale brown, or brown gravelly loam, very gravelly loam, cobbly loam, or very cobbly loam. The underlying layers are reddish brown, brown, or strong brown very gravelly loam or very cobbly sandy clay loam.

These soils are subject to flooding. Depth to the water table varies according to the time of the year. Other properties are variable.

The canyon sides offer little chance for management because of the Rock outcrop and steep slopes. These areas are scenic. Ustifluvents on the bottom land in canyons are limited by periodic flooding and erosion. Ustifluvents support discontinuous stands of ponderosa pine. Management of these stands is difficult because the soils are so variable. Grazing is confined to the bottom land because the canyon sides are generally too steep. Management should prevent overgrazing of the soils. These soils provide some habitat for mule deer.

RUA—Ruidoso association, nearly level. This association consists of areas of deep, well drained soils. These soils occur in a regular and repeating pattern mainly on relic alluvial fans dissected by both perennial and intermittent streams and arroyos (fig. 9). The Rui-

doso soils are in concave areas and swales. Soils similar to the Ruidoso soils but with a gravelly substratum are on the edges and higher parts of the alluvial fans. The soils formed in fine textured alluvial sediment derived from the basic igneous rock in the mountains to the east and some gravel layers. Mapped areas are broad and fan shaped and are 600 to 800 acres in size.

The Ruidoso soils make up about 45 percent of the association. Typically, the surface layer is grayish brown fine sandy loam and dark grayish brown silt loam about 21 inches thick. The upper part of the subsoil is dark grayish brown silt loam about 11 inches thick, and the lower part is brown clay loam to a depth of more than 60 inches.

These soils are calcareous and mildly alkaline throughout. Permeability is slow, and available water capacity is high. The soils are high in organic matter above a depth of more than 30 inches.

About 35 percent of this association is soils that are similar to the Ruidoso soils except that the lower part of the subsoil is very gravelly clay loam and the substratum is very gravelly sandy loam.

Permeability of these soils is moderately slow, and available water capacity is moderate.

Included in mapping are a few areas of Gabaldon and Shanta soils and riverwash. The Shanta and Gabaldon soils are in low positions. Riverwash is on bottom land of streams and arroyos. These soils make up about 20 percent of each mapped area.

The potential of this association for grazing is high. Grazing management should improve or maintain the plant cover, let litter accumulate, and prevent accelerated soil erosion.

Grazing should be managed to increase the production and reproduction of the desirable grasses, such as sideoats grama and black grama, and a variety of palatable forbs. Periodically deferring grazing during the summer growing season, July through September, improves the vigor and reproduction of the warm-season grasses such as sideoats grama. Spring rest from grazing encourages the forbs. Varying the seasons of grazing and rest from year to year maintains a balanced plant community that provides high quality forage all year. Continuous year-long grazing results in a plant community dominated by galleta, ring muhly, creeping muhly, and broom snakeweed. Range in this condition is of little value for grazing and is subject to accelerated soil erosion.

Mechanical range seeding is feasible. Adapted species include improved varieties of little bluestem and spike muhly. Cholla should be controlled by mechanical root cutting and stacking. The spread of yucca can be checked by letting cows graze while it is in flower in May or June. The most common invader is broom snakeweed. It can be kept to a minimum by deferring grazing in early spring to permit cool-season grasses to compete for the moisture. Grazing management that includes fencing, pipelines, livestock watering facilities, earthen ponds, and dams is suitable for these soils.

The potential for wildlife habitat is moderate. These soils produce native plants that provide food and cover for scaled and Gambel quail, wild turkey, white-tailed and mule deer, black bear, mountain lion, and pronghorn antelope.

The potential for farming is high. The slow permeability is not too great a limitation. These soils can be dry-farmed about 3 years out of 5. The inherent fertility is very high in these soils, but residue should be returned to the soil to reduce erosion and maintain the organic matter content.

The potential for urban use is moderate. The moderate shrink-swell potential and slow permeability limit foundations, roads, and septic tank filter fields.

Windbreaks can easily be established on this association. Trees needing more than 17 inches per year of precipitation can be irrigated. Wildlife habitat can be improved by growing forbs acceptable to wildlife. This area could be naturally seeded or planted with adaptable introduced species where past use has caused erosion.

SGA—Shanta-Gabaldon association, nearly level. This association consists of areas of deep, well drained soils. These soils occur in a regular and repeating pattern on narrow flood plains and adjacent terraces dissected by one major stream and many smaller side tributaries. Both soils are adjacent to the stream beds, but the Shanta soils occur more commonly on the first and second terraces. These soils formed in moderately fine textured alluvial sediment derived from basic igneous rocks in the mountains to the east. They have received deposits of calcareous eolian material in recent times. Mapped areas are long and narrow and follow the stream. Individual areas of each soil are 40 to 100 acres in size.

The Shanta soils make up about 55 percent of the association. Typically, the surface layer is dark brown loam about 13 inches thick. The upper 14 inches of the substratum is dark brown silt loam. Below that, the substratum is brown sandy loam to a depth of more than 60 inches.

These soils are calcareous and mildly alkaline to moderately alkaline. Permeability is moderate, and available water capacity is high.

The Gabaldon soils make up about 25 percent of the association. Typically, the upper 9 inches of the surface layer is brown fine sandy loam, and the lower 11 inches is grayish brown silt loam. Below that, the soil is brown silt loam to a depth of 60 inches.

These soils are calcareous throughout and are mildly alkaline. Permeability is moderate, and available water capacity is high.

In the western third of the delineations of this association, the soils are warmer than typical.

Included in mapping are a few areas of Reeves Variant and La Fonda soils and riverwash. These soils make up about 20 percent of the association.

This association is used for grazing, farming, and homesites. Wildlife use this association to a large extent.

Potential for grazing is high. Grazing management should improve or maintain the plant cover, let litter accumulate, and prevent accelerated soil erosion.

Grazing should be managed to increase the production and reproduction of the desirable grasses such as sideoats grama, giant sacaton, and vine-mesquite and a variety of palatable forbs. Periodically deferring grazing during the summer growing season, July through September, improves the vigor and reproduction of the warm-season grasses such as sideoats grama. Spring rest from grazing encourages the forbs. Fall and winter rest is beneficial to shrubs. Varying the seasons of grazing and rest from year to year maintains a balanced plant community that provides high quality forage all year. Continuous year-long grazing results in a plant community dominated by oak, cacti, mesquite, oneseed juniper, yucca, and creeping muhly. Range in this condition is of little value for grazing and is subject to accelerated soil erosion.

Mechanical range seeding is feasible on these soils. Adapted species include improved varieties of little bluestem, sideoats grama, blue grama, vine-mesquite, plains bristlegrass, and fourwing saltbush. Mechanical brush management should be selective because of the variety of beneficial trees and shrubs and the nearby perennial stream. Dozing or root-cutting and stacking of oneseed juniper and cholla is preferable. The spread of yucca can be checked by letting cows graze while it is in flower in May or June. Grazing management that includes fencing, earthen ponds, and dams is suitable.

The potential for wildlife habitat is moderate. These soils produce native plants that provide food and cover for scaled, harlequin, and Gambel quail, mourning and white-winged dove, band-tailed pigeon, wild turkey, pronghorn antelope, mountain lion, black bear, and desert bighorn.

The potential for farming is high. Only the hazard of erosion limits these soils.

The potential for urban use is low to moderate because of the potential for flooding. Onsite disposal of waste from septic tank filter fields could lead to contamination of water moving into streams.

TAC—Tencee very gravelly silt loam, 0 to 10 percent slopes. This shallow, well drained soil is on nearly level to rolling, limestone-controlled uplands. The landscape is mainly low mesas and ridgetops on uplands. The soils formed in gravelly alluvium. The landscape has been dissected and truncated. The mapped areas are broad and are 500 to more than 3,000 acres in size.

Typically, the upper 15 inches of the soil is grayish brown and light brown very gravelly silt loam. This layer is 35 to 80 percent gravel in the form of carbonate nodules and limestone fragments. The next 18 inches is an indurated lime layer of extremely hard, carbonate-cemented material. Below that is a very pale brown and white cobbly silt loam to a depth of more than 60 inches.

Included with this soil in mapping are small areas of Reakor, Tome, and Reyab soils in small drainageways; Philder soils in the western part of the survey area; and Lozier soils and Rock outcrop on ridgetops and small escarpments. These inclusions make up about 15 percent of any mapped area. Individual areas of these soils are generally smaller than 20 acres.

This soil is strongly calcareous throughout and moderately alkaline. Permeability is moderate, and available water capacity is very low. Water runs off this soil onto surrounding soils, especially from the more sloping areas.

This soil is used for grazing and wildlife habitat.

The potential for grazing is moderate to low. Grazing management should maintain the plant cover, let litter accumulate, and prevent accelerated soil erosion.

Grazing should be managed to increase the composition and production of black grama, bush muhly, fourwing saltbush, and Mormon-tea as well as perennial forbs. Rest from grazing during July, August, and September benefits the vigor and composition of the desirable warm-season grasses and permits them to reproduce. Spring rest favors forbs. Rest during fall and winter favors vigor of shrubs and production of browse. Varying the seasons of grazing and rest from year to year maintains a balance of shrubs, forbs, and grasses that provide quality forage all year.

This soil is not suitable for mechanical manipulation, fencing, pipelines, or watering facilities. Watering facilities should be placed on the deeper included soils near drainageways where possible.

The potential for wildlife habitat is low. These soils produce native plants that provide food and cover for scaled quail, mourning and white-winged dove, pronghorn antelope, mule deer, and desert bighorn.

The potential for farming and urban use is low because of the small amount of water available for irrigation, depth to hard lime, and location.

TDB—Tome silt loam, 0 to 5 percent slopes. This deep, well drained, nearly level to gently sloping soil is on flood plains and lower parts of pediment side slopes of major streams and basins. Parts of this unit are flooded each year. All areas receive runon water from surrounding areas. The soil formed in calcareous alluvium derived from limestone. Eolian material has been added in many places, principally in the western part of the survey area. The mapped areas are mostly elongated and are 400 to 1,000 acres in size.

Typically, the surface layer is pale brown silt loam about 5 inches thick. Below that, the soil is pale brown,

weakly stratified silt loam to a depth of more than 60 inches.

Included with this soil in mapping in the eastern part of the survey area are small areas of Crowflats soils in drainageways, Tencee and Nickel soils near pediments, and Holloman and Reeves soils near gypsiferous areas. These soils make up about 15 percent of the mapped areas. Included with this soil in the western part of the survey area are small areas of Prelo and Largo soils in drainageways, Ogral and Emot soils along the upper parts of streams, and Nickel soils near the fans of fast flowing streams.

This soil is strongly calcareous throughout and moderately alkaline. Permeability is moderately slow, and available water capacity is high.

In the eastern part of the survey area this soil is used primarily for grazing and to a limited extent for irrigated crops. There are no serious limitations on these uses, but the soil is highly susceptible to wind and water erosion when the surface cover is removed. The areas that are flooded afford excellent grazing during periods of drought. In the western part of the survey area this soil is used for irrigated crops and pasture, urban development, and grazing. The soil has medium potential for row crops and small grains under irrigation.

Potential for grazing is moderate. Grazing management should maintain the plant cover, let litter accumulate, and prevent accelerated soil erosion.

Grazing should be managed to increase the production and reproduction of the desirable warm-season grasses such as black grama, bush muhly, and alkali sacaton and shrubs such as winterfat. Periodically deferring grazing during the summer growing season, June through September, improves the vigor and reproduction of the grasses. Spring rest from grazing is beneficial to the forbs and fall and winter rest improves the vigor and reproduction of shrubs. Varying the seasons of grazing and rest from year to year maintains a balanced plant community that provides quality forage available all year. Continuous year-long grazing results in a plant community dominated by creosotebush, American tarbush, cholla, yucca, and burrograss. Range in this condition is of little value for grazing and is commonly subject to accelerated soil erosion.

This soil is suitable for range seeding where it receives overflow water. Adapted species include improved varieties of sideoats grama, black grama, blue grama, plains bristlegrass, vine-mesquite, alkali sacaton, winterfat, and fourwing saltbush. Both chemical and mechanical brush management are feasible on this soil. The spread of yucca can be checked by letting cows graze while yucca is in flower in May and June. This soil is well suited to grazing management that includes fencing, underground pipelines, livestock watering facilities, earthen dams, and ponds.

The potential is moderately high or high for irrigated pasture and adapted hay. Good tilth can be maintained by returning crop residue to the soil and by minimum tillage.

The soil has generally high potential for urban uses. The parts of the unit subject to overflow require protection by diversion dikes or dams. The moderately slow permeability of the subsoil limits septic tank absorption fields. Larger than normal fields should be used where off-site disposal is not possible.

The potential for wildlife habitat is moderate. This soil produces native plants that provide food and cover for scaled and Gambel quail, mourning and white-winged dove, and pronghorn antelope.

Most adapted shrubs and trees do well if irrigated. Arizona cypress is well adapted to windbreaks where supplemental water is available.

TOE—Tortugas cobbly loam, 5 to 30 percent slopes. This shallow, well drained soil is on ridges and hills. Elevation ranges from 5,000 to 7,500 feet. This soil formed in residuum from limestone and calcareous sandstone.

Typically, the upper 4 inches of the surface layer is dark grayish brown cobbly loam, and the lower 6 inches is dark grayish brown extremely cobbly clay loam. Fractured limestone bedrock is at a depth of 10 inches. Soil material is in the rock fractures.

Included with this soil in mapping are small areas of Deama and Encierro soils.

Effective rooting depth of this soil is 20 inches or less. Some roots penetrate the fractures in the bedrock. Permeability is moderate, and available water capacity is very low. The erosion hazard is moderate.

The vegetation of this soil is pinyon-juniper woodland and an understory of grasses and forbs. Pinyon pine is the dominant tree because of elevation and precipitation.

Management is limited by shallow soil depth. These soils are used for grazing and firewood production. The density of the plant cover should be maintained to reduce the moderate erosion hazard. This soil supplies some habitat for deer.

TPE—Tortugas-Deama association, moderately steep. This association consists of areas of moderately steep, shallow, well drained soils on hills, mesa tops, and canyon sides. Elevation ranges from 5,000 to 6,000 feet. The Tortugas soils are on the north-facing side slopes, and Deama soils are on the south-facing side slopes. The Tortugas soils formed in residuum from interbedded sandstone, limestone, and dolomite. The Deama soils formed in residuum from limestone.

Tortugas very gravelly loam makes up about 45 percent of this association. Typically, the upper 4 inches of the surface layer is dark grayish brown very gravelly loam, and the lower 6 inches is dark grayish brown very cobbly clay loam. Fractured limestone, dolomite, and sandstone bedrock is at a depth of 10 inches. Soil material is in the fractures.

The effective rooting depth of this soil is 20 inches or less. Some roots penetrate in the bedrock. Permeability is moderate, and available water capacity is very low. The erosion hazard is severe.

Deama very gravelly loam makes up 35 percent of this association. Typically, the surface layer is brown very gravelly loam about 4 inches thick. The substratum is dark grayish brown very gravelly clay loam 11 inches thick. Partially fractured limestone bedrock is at a depth of 15 inches.

Effective rooting depth of this soil is 20 inches or less. Some roots penetrate the fractures in the bedrock. Permeability is moderate, and available water capacity is very low. The erosion hazard is severe.

Included in mapping are small areas of Holloman Variant, Pena, and Shanta soils. Holloman Variant and Pena soils are on hills, and Shanta soils are on fans. These soils make up about 20 percent of the complex.

The natural vegetation on the Tortugas soil is pinyon-juniper woodland. The natural vegetation on the Deama soil is juniper-pinyon woodland with scattered live oak. The understory for both soils is grass and forbs. The woodland on these soils differs because the Tortugas soil has higher effective precipitation than the Deama soil.

Management is limited by shallow soil depth, very low available water capacity, and moderately steep slopes. These soils are used for grazing and firewood production. The plant cover density should be maintained to reduce the severe erosion hazard. Grazing should be managed to benefit warm-season grasses. Cutting pinyon pine for firewood should be lighter on south-facing slopes than on north-facing slopes. Oneseed juniper and live oak will encroach on south-facing slopes if the pinyon is cut over. These soils provide some habitat for mule deer.

TPG—Tortugas-Deama association, very steep. This association consists of steep to very steep, shallow, well drained soils on hills, mesa tops, and canyon sides. Elevation ranges from 5,000 to 6,000 feet. The Tortugas soils are on north-facing side slopes, and Deama soils are on south-facing side slopes. The Tortugas soils formed in residuum derived from interbedded sandstone, limestone, and dolomite. The Deama soils formed in residuum derived from limestone.

Tortugas very gravelly loam makes up about 45 percent of this association. Typically, the upper 4 inches of the surface layer is dark brown very gravelly loam, and the lower 6 inches is dark grayish brown cobbly clay loam. Fractured limestone, dolomite, and sandstone bedrock is at a depth of 10 inches. Soil material is in the fractures.

Effective rooting depth of this soil is 20 inches or less. Some roots penetrate the fractures in the bedrock. Permeability is moderate, and available water capacity is very low. The erosion hazard is severe.

Deama very gravelly loam makes up 35 percent of this association. Typically, the surface layer is brown very gravelly loam about 4 inches thick. The substratum is dark brown very gravelly clay loam about 11 inches thick. Partially fractured limestone bedrock is at a depth of 15 inches.

The effective rooting depth of this soil is 20 inches or less. Some roots penetrate the fractures in the bedrock. Permeability is moderate, and available water capacity is very low. The erosion hazard is severe.

Included in mapping are small areas of Holloman Variant, Pena, and Shanta soils. Holloman Variant and Pena soils are on hills. Shanta soils are on fans. These soils make up about 20 percent of the association.

The natural vegetation on the Tortugas soil is pinyon-juniper woodland. The natural vegetation on the Deama soil is juniper-pinyon woodland with scattered live oak. The understory on both soils is grasses and forbs. The woodland on these soils differs because the Tortugas soil has higher effective precipitation than the Deama soil.

Management is limited by shallow soil depth, very low available water capacity, and very steep slopes. These soils are used for grazing and firewood production. The plant cover density should be maintained to reduce the severe erosion hazard. Grazing should be managed to benefit warm-season grasses. Cutting of pinyon pine for firewood should be lighter on south-facing slopes than on north-facing slopes. Oneseed juniper and live oak will encroach on south-facing slopes if the pinyon pine is cut over. These soils provide some habitat for mule deer.

Descriptions of the high detail map units

The high detail soil map covers an area of about 90,000 acres in the Tularosa Basin (fig. 1). This area includes most of the urban development and irrigated farmland in the Otero Area. In the high detail survey the soils were examined at closer intervals than in the low detail survey, the composition of the units is less variable, and the map units are narrowly defined. Most of the units commonly include areas of other soils less than 3 acres in size. The units on the high detail map are suitable for planning intensive uses of the soil, such as irrigated farming or urban development.

The acreage and proportionate extent of each high detail map unit are given in table 4, and additional information on properties, limitations, capabilities, and potentials for many soil uses is given for each kind of soil in other tables in this survey. (See "Summary of tables.") Many of the terms used in describing soils are defined in the Glossary.

AbB—Alamogordo very fine sandy loam, 0 to 3 percent slopes. This deep, well drained, nearly level to very gently sloping soil is on broad, dissected upper

parts of the basin floor. Slopes are smooth. Individual areas are 50 to 400 acres in size.

Typically, the surface layer is yellowish brown very fine sandy loam about 6 inches thick. The upper 10 inches of the substratum is white very fine sandy loam that contains very large amounts of gypsum. Below this, the substratum is light brown very fine sandy loam to a depth of more than 60 inches. This layer is high in gypsum but has less than the upper part of the substratum.

Included with this soil in mapping are areas of Alamogordo soils that have less gypsum and small areas of eroded Alamogordo soils, Holloman very fine sandy loam, Alamogordo silt loam, and Gypsum land. Also included are small areas of soils that have a strongly cemented layer, about 6 inches thick, of gypsiferous material at a depth of 18 to 22 inches. These inclusions make up about 25 percent of the unit, but separate areas are generally smaller than 3 acres.

This soil is calcareous above a depth of about 45 inches and noncalcareous below this depth. Permeability is moderately rapid, and available water capacity is low. The root zone is shallow because of the large amount of gypsum in the upper part of the substratum, but roots of native grasses can penetrate the layer that is high in gypsum.

This soil has very low potential for farming. The potential is limited by the thinness of the surface layer, the moderately rapid permeability, and the low available water capacity. These limitations are caused by the large amount of gypsum under the surface layer. If cultivated crops are grown, the wind erosion hazard is severe, especially in spring when strong winds are common. Minimum tillage, cover crops, and windbreaks should be used when cultivated crops are grown.

This soil has high potential for native range. Many areas of this soil have good stands of alkali sacaton and fourwing saltbush. Good management is needed to prevent overgrazing. Good water distribution, proper grazing, and pasture rotation increase production of grazable species.

This soil has very low potential for windbreak species. Onsite investigation is needed to determine what adapted species, if any, can be grown. Special site preparation is necessary.

The potential for most urban uses is low. Limitations for foundations and underground utilities are severe. The low strength and corrosiveness of the soil and the highly soluble nature of the gypsum can be overcome by good design and careful installation and by use of noncorrodible materials. The limitation for water-holding structures, such as pit tanks, is severe; several methods of lining that overcome this limitation are available.

The potential for wildlife habitat is low. This soil produces only limited pasture, hay, and row crops that provide food and some cover for a variety of wildlife, including scaled and Gambel quail and mourning and white-winged dove. Russian-olive, several shrub and forb species, and grasses planted along unlined irrigation ditches, fence rows, and odd areas improve habitat. Protected strip plantings of grain or green forage also provide food and cover.

AcA—Alamogordo silt loam, 0 to 1 percent slopes. This deep, well drained, nearly level soil is in broad areas on the basin floor, usually near the lower end of intermittent drainageways. A layer of silty material has been deposited on the surface. Slopes are smooth. Individual areas are irregular in shape and are 20 to 150 acres in size.

Typically, the upper part of the surface layer is reddish brown silt loam about 4 inches thick. This layer has been deposited by water. The lower part of the surface layer is brown loam about 9 inches thick. The upper 12 inches of the substratum is pinkish white loam, that is high in gypsum. Below that, the substratum is light brown very fine sandy loam to a depth of more than 60 inches.

This soil is calcareous throughout. The substratum is high in gypsum. Permeability is moderate to moderately rapid, and available water capacity is low. Tilth is poor, and the soil can be worked only over a moderate range of moisture conditions. The root zone is shallow because the layer of gypsum restricts many plant roots.

The potential for farming is low. The amount of gypsum in the soil limits the selection of crops to those that are salt tolerant. A plentiful supply of water is needed for irrigation on this soil.

This soil is used for grazing and has good stands of alkali sacaton. Shallow-rooted plants are better suited to this soil than deep-rooted plants.

The potential for urban development is low. The large amount of gypsum presents many problems. The low strength and corrosiveness of the soil and the highly soluble nature of the gypsum can be overcome by good design, careful installation, and use of suitable fill material. Septic tank absorption fields are not restricted, but contamination of groundwater can result from moderately rapid permeability, high concentration of facilities, and formation of pits as gypsum dissolves.

This soil has very low potential for windbreak species. Onsite investigation is needed to determine what adapted species, if any, can be grown. Special site preparaton is necessary.

The potential for wildlife habitat is low to moderate. This soil produces limited pasture, hay, and row crops that provide food and some cover for a variety of wildlife, including scaled and Gambel quail and mourning and white-winged dove. Russian-olive, several shrub and forb species, and grasses planted along unlined irrigation ditches, fence rows, odd areas, and flood plains improve habitat. Protected strip plantings of grain or green forage also provide food and cover.

AdB—Alamogordo-Aztec complex, 1 to 3 percent slopes. This complex consists of small areas of deep, well drained soils. These soils are so intermingled that it is not feasible to separate them on the high detail map. Areas of this complex are relatively narrow and elongated and are 40 to 150 acres in size. They are dissected by small drainageways that are oriented basically east-west. Individual areas of each soil are about 2 to 3 acres in size.

Alamogordo very fine sandy loam makes up about 45 percent of each mapped area. It is mainly on the gently sloping side slopes and bottom land, but some areas are on small ridgetops. Typically, the surface layer is light brown very fine sandy loam about 7 inches thick. The upper 8 inches of the substratum is pinkish white loam that is very high in gypsum. Below that, the substratum to a depth of more than 60 inches is light brown very fine sandy loam that is high in gypsum.

This soil is high in gypsum and is strongly calcareous throughout. Permeablity is moderately rapid, and available water capacity is low.

Aztec fine sandy loam makes up 35 percent of each mapped area. It is mainly on the small narrow ridgetops, but may occur anywhere in the unit. Typically, a desert pavement 1 inch thick is on the surface. The surface layer is light brown fine sandy loam about 5 inches thick. The upper 11 inches of the substratum is pinkish white gravelly sandy loam that is very high in gypsum. Below this, the substratum to a depth of more than 60 inches is pinkish white very gravelly fine sandy loam that is high in gypsum.

This soil is high in gypsum and carbonates. Permeability is moderately rapid below a depth of 16 inches, and available water capacity is low.

Included with these soils in mapping are areas of exposed gypsum, Largo very fine sandy loam, Prelo fine sandy loam, and a few scattered wind hummocks. These inclusions make up about 20 percent of this unit.

This complex has low potential for farming. These soils have been used for irrigated crops in some areas, but production was very low. Several limitations that are difficult to overcome adversely affect most crops grown in this area. The amount of gypsum limits the selection of crops to those that are salt tolerant. The gypsum also acts as a barrier to roots of many crops, thus limiting effective rooting depth. Because available water capacity is low, these soils are very droughty. These soils are unsuitable for any type of water-holding structure, such as pit tanks and storage reservoirs and dams, unless plastic liners are used. Solubility of the gypsum, seepage, and compressibility are the major restrictions on these types of structure.

These soils have very low potential for windbreak species. Onsite investigation is needed to determine what adapted species, if any, can be grown. Special site preparation is necessary.

Increased population growth in this county and development of small ranchettes has resulted in increased urbanization. The shallow depth to gypsum and its inherent properties limit foundations and streets and roads. Good design and careful installation and the use of suitable fill help to overcome these problems. Septic tank absorption fields are not restricted, but contamination of ground water may result from moderately rapid permeability, a high concentration of facilities, and formation of pits as gypsum dissolves.

The potential of this complex for wildlife habitat is low. The soils produce only limited pasture and hay that provide very little food and some cover for a few species of wildlife, including scaled and Gambel quail and mourning and white-winged dove. Russian-olive, several shrub and forb species, and grasses planted along unlined irrigation ditches, fence rows, odd areas, and flood plains improve habitat. Protected strip plantings of grain or green forage on the included soils also provide food and cover.

AhB—Alamogordo-McCullough sandy loams, hummocky, 0 to 3 percent slopes. This complex consists of medium to large areas of deep, well drained soils on pediment fans and foot slopes. These soils are so intermingled that it is not feasible to separate them on the high detail map. Areas of this complex are wide and elongated and are 50 to 200 acres in size. The areas are oriented northeast-southwest. Individual areas of each soil are generally smaller than 3 acres.

Alamogordo sandy loam makes up about 40 percent of each mapped area. It is on the lower parts of the slightly undulating landscape. Typically, the surface layer is reddish brown sandy loam about 6 inches thick. The upper 9 inches of the substratum is light brown fine sandy loam that is high in gypsum and contains as much as 10 percent gravel. Below that, the substratum is reddish brown gravelly loam that is thinly stratified with reddish brown very gravelly sandy loam to very gravelly silt loam. Gypsum content decreases with depth. This soil has more gravel and is redder than typical Alamogordo soils.

This soil is calcareous throughout and is high in gypsum in the upper part of the substratum. Permeability is moderately rapid, and available water capacity is low.

McCullough sandy loam makes up about 35 percent of each mapped area. It is on the higher parts of the slightly undulating landscape. Typically, the surface layer is reddish brown sandy loam about 6 inches thick. In some areas a desert pavement is on the surface. The upper 16 inches of the substratum is reddish brown sandy loam and contains accumulations of gypsum as small nests of very fine crystals and as pendants underneath the pebbles. Below that, the substratum to a depth of more than 60 inches is reddish brown sandy loam that does not have segregations of gypsum. Gypsum content decreases with depth. Gypsum is absent in some places.

This soil is calcareous throughout. Permeability is moderately rapid, and available water capacity is low.

Included with these soils in mapping are some areas of Tobler soils in the small shallow drainageways that meander across the map unit. Also included are a few small intermingled areas of Prelo and Largo soils at lower positions on the landscape. These included soils make up about 25 percent of this complex. Individual areas are smaller than 3 acres. Small wind hummocks of sandy loam, fine sandy loam, very fine sandy loam, or loam are scattered throughout the unit.

This complex has low potential for farming. Low natural fertility, gypsum content, and low water-holding capacity are limitations, but they can be partially overcome by proper management. The wind hummocks limit farming and should be leveled if the soils are to be used. Some areas have been leveled and are irrigated. Cotton, small grains, and alfalfa are grown, but yields are low except where large amounts of fertilizer have been added and irrigation water is well managed. This complex has a severe erosion hazard if the surface is left bare, especially during spring and summer when winds are strong and heavy rain storms occur.

These soils have low potential for adapted windbreak species. Trees such as Arizona cypress, Rocky Mountain juniper, green ash, Siberian elm, and Russian-olive and the shrubs squawbush, lilac, and American plum can be grown, but in places special treatment is required to overcome specific soil conditions.

These soils have moderate to high potential for most urban uses. Low strength, pitting, and corrosivity can be overcome by good design and careful installation and by use of noncorrodible materials.

This complex has moderate potential for wildlife habitat. The McCullough soil produces pasture, hay, orchards, and row crops that provide food and some cover for a variety of wildlife, including scaled and Gambel quail and mourning and white-winged dove. Russian-olive, cottonwood, several shrub and forb species, and grasses planted along unlined irrigation ditches, fence rows, odd areas, and flood plains improve habitat. Protected strip plantings of grain or green forage also provide food and cover.

AkA—Alamogordo Variant very fine sandy loam, 0 to 1 percent slopes. This deep, well drained, nearly level soil is in lower, slightly depressional areas on the basin floor. Slopes are smooth and concave. Individual areas are 30 to 250 acres in size.

Typically, the surface layer is light brownish gray very fine sandy loam about 6 inches thick. The subsoil is pale brown and yellowish brown loam about 9 inches thick. The upper 12 inches of the substratum is yellowish brown loam. The lower part of the substratum to a depth of more than 60 inches is light brown and brown very fine sandy loam that is high in gypsum.

Included with this soil in mapping are small intermingled areas of Alamogordo very fine sandy loam, Alamogordo soils that have been eroded, and Alamogordo silt loam. Also included are small intermingled areas of soils that have a strongly cemented gypsum layer, 2 to 6 inches thick at a depth of 15 to 18 inches. Also included are some wind hummocks. The included soils make up about 25 percent of the unit. Individual areas are generally smaller than 3 acres.

This soil is calcareous throughout, but calcium carbonate content decreases with depth. Content of gypsum increases below the subsoil. Permeability is moderate. Available water capacity is low to moderate, depending on the amount of gypsum in the profile. Tilth is fair, and the soil can be worked over a moderate range of moisture conditions. The root zone is deep and easily penetrated by plant roots.

This soil has medium potential for row crops and small grains, but high yields may be obtained under good management. The potential is reduced by the amount of gypsum. The soil has high potential for hay and pasture crops, but production is limited by the gypsum. Good tilth can be maintained by returning crop residue to the soil. The wind erosion hazard is severe if cultivated crops are grown, especially in spring, when strong winds are common. Minimum tillage, stripcropping, cover crops, and windbreaks reduce erosion.

This soil has high potential for grazing. Good stands of alkali sacaton and fourwing saltbush are present. Management should prevent overgrazing. Good distribution of water, proper grazing, and pasture rotation increase production of grazable species.

This soil has a moderate potential for adapted windbreak species. Trees such as Arizona cypress, Rocky Mountain juniper, green ash, Siberian elm, and Russian-olive and the shrubs squawbush, lilac, and American plum can be grown with little or no difficulty. Some other species can be grown, but special treatment is required to overcome specific soil conditions.

This soil has moderate potential for most urban uses. Low strength and corrosivity can be overcome by good design and careful installation and by using materials that resist corrosion.

This soil has moderate potential for wildlife habitat. It produces hay, pasture, and row crops that provide food and cover for a variety of wildlife, including scaled and Gambel quail and mourning and white-winged dove. Russian-olive, several shrub and forb species, and grasses planted along unlined irrigation ditches, fence rows, and odd areas improve habitat. Protected strip plantings of grain or green forage also provide food and cover.

AnD—Aztec gravelly fine sandy loam, 3 to 12 percent slopes. This deep, well drained soil is on dissected fans on pediments. It occupies truncated upper pediment positions. Many gullies cut by fast flowing streams are

common. Slopes are undulating to rolling. Individual areas are 50 to over 200 acres in size.

Typically, the surface layer is light brown, gravelly fine sandy loam about 6 inches thick. The upper 20 inches of the substratum is pinkish white gravelly sandy loam that is high in gypsum. Below that, the substratum is light brown very gravelly sandy loam to a depth of more than 60 inches.

Included with this soil in mapping are areas of Alamogordo and Emot soils. The Alamogordo soils are in small, nearly level areas. The Emot soils are intermingled with this Aztec soil, mostly on the lower edges of the mapped areas. Nickel soils are also included near the upper edges of the pediment. The included soils make up about 10 to 20 percent of this unit. Individual areas generally are smaller than 1 or 2 acres.

This soil is calcareous throughout and is high in gypsum. Permeability is rapid below a depth of 26 inches, and available water capacity is low. Since gypsum is present the soil normally appears moist, but the moisture is not normally available to plants. The root zone is deep, but not all plants can survive because of the high content of gypsum.

This soil has no potential for farming, even under irrigation. The gravel in the soil, the large amount of gypsum, and slope limit all uses except native range and wildlife habitat. Erosion is a hazard when the site is disturbed, because the gypsum dissolves away.

This soil has very low potential for windbreak species. Onsite investigation is needed to determine what adapted species, if any, can be grown. Special site preparation is necessary.

This soil has low potential for most urban uses; nevertheless, urban development has taken place on this soil in some areas. This soil is poorly suited to buildings because it can cave in as the gypsum dissolves away. Many houses built on this soil have cracked foundations and other problems as a result of the gypsum dissolving. Also, underground pipe can corrode. Septic tank absorption fields are limited by the rapid permeability, which can cause seepage downslope or allow contamination of shallow ground water.

The potential for wildlife habitat is low. This soil produces little pasture and hay that provide food and some cover for a variety of wildlife, including scaled and Gambel quail and mourning and white-winged dove. Russian-olive, several shrub and forb species, and grasses planted along unlined irrigation ditches, fence rows, odd areas, and flood plains improve habitat. Protected strip plantings of grain or green forage also provide food and cover.

AoB—Aztec-Alamogordo complex, hummocky, 1 to 3 percent slopes. This complex consists of small areas of deep, well drained soils, generally on low ridgelike positions on the basin floor and on sides of pediments. These soils are so intermingled that it was not feasible to separate them on the high detail map. Areas of this complex are narrow and elongated and are 10 to 100 acres in size. Areas are oriented northeast-southwest. Individual areas of each soil are about 2 to 3 acres in size.

Aztec gravelly fine sandy loam makes up about 40 percent of each mapped area. Typically, the surface layer is pink gravelly fine sandy loam about 5 inches thick. The upper 12 inches of the substratum is pinkish white gravelly loam. Below that, the substratum to a depth of more than 60 inches is pink very gravelly fine sandy loam that is very high in gypsum. A desert pavement covers 20 to 80 percent of the surface.

This soil is high in gypsum and is strongly calcareous throughout. Permeability is moderately rapid below a depth of 17 inches, and available water capacity is low.

Alamogordo fine sandy loam makes up about 35 percent of each mapped area. Typically, the surface layer is light brown fine sandy loam about 7 inches thick. The upper 10 inches of the substratum is pinkish white loam that is very high in gypsum. Below that, the substratum to a depth of more than 60 inches is light brown very fine sandy loam. A desert pavement covers 20 to 80 percent of the surface.

This soil is low in natural fertility and organic matter. It is high in gypsum, but gypsum content decreases with depth. It is strongly calcareous throughout. Permeability is moderate, and available water capacity is low.

Included in mapping are a few areas of Gypsum land, Prelo silt loam, Prelo sandy loam, and Largo very fine sandy loam. Also included are wind hummocks of very fine sandy loam, fine sandy loam, and loam. These hummocks are generally less than 3 feet high and are as large as 10 feet in diameter. They are interspersed throughout the mapped areas. Inclusions make up about 25 percent of this complex.

This complex has low potential for farming. These soils have been used for irrigated crops in some areas, but production of all crops grown was very low. The amount of gypsum limits the selection of crops to those that are very salt tolerant. The gypsum also acts as a barrier to roots, limiting effective rooting depth. The available water capacity is low, and these soils are very droughty. The soils in this complex are unsuitable for any type of water holding structure, such as pit tanks, storage reservoirs, and dams, unless plastic liners are used. Formation of pits as gypsum dissolves, seepage, and compressibility are the major restrictions on these types of structure.

This complex has very low potential for windbreak species. Onsite investigation is needed to determine what adapted species, if any, can be grown. Special site preparation is necessary.

Increased population growth in this county and development of small ranchettes has resulted in increased urbanization. The shallow depth to gypsum and its inherent properties limit foundations, streets, and roads. The

use of good road fill and good design help to overcome these problems. Septic tank absorption fields are not restricted but contamination of ground water may result from the permeability, a high concentration of facilities, and formation of pits as gypsum dissolves.

The potential for wildlife habitat is low. These soils produce only limited pasture, hay, and row crops that provide food and some cover for a variety of wildlife, including scaled and Gambel quail and mourning and white-winged dove. Russian-olive, several shrub and forb species, and grasses planted along unlined irrigation ditches, fence rows, odd areas, and flood plains improve habitat. Protected strip plantings of grain or green forage also provide food and cover.

Gu—Gullied land. This high detail map unit consists of nearly level to gently sloping dissected areas on alluvial fans and pediment toe slopes adjacent to major drainageways (fig. 10). Areas are 80 feet wide. Areas are dominated by many gullies as much as 20 feet deep. The gully pattern is tightly dendritic. Cutting at the head of gullies and piping are common.

A typical area of Gullied land is about 45 percent gullies more than 2 feet deep. Isolated remnants of Prelo and Largo soils are between gullies. Torrifluvents, Ustic Torriorthents, and Alamogordo soils make up the rest of this unit. Torrifluvents and Ustic Torriorthents are at the bottom of the gullies. Alamogordo soils are in the convex, ridgelike areas between or adjacent to the gullies.

Because these areas are highly erodible, their use is extremely limited. The water erosion hazard is severe. Major erosion- and flood-control projects are necessary to stabilize these areas.

GyC—Gypsum land, 0 to 9 percent slopes. This high detail map unit consists of unconsolidated gypsiferous sediments of lacustrine and eolian origin. It is on level to gently sloping sides of drainageways. Slopes are smooth and slightly convex. Individual areas are elongated and irregular in shape and are 3 to 60 acres size.

Typically, the gypsum is more than 60 inches thick. The exposed material is soft, or it is slightly hard where reaction with water has caused some cementation. As much as 2 inches of eolian soil material has been deposited on the surface in some areas.

Included with this gypsum land are a few intermingled areas of Holloman soils. Inclusions make up less than 15 percent of any area. Individual areas are generally smaller than 1 acre.

Gypsum land is calcareous throughout. Available water capacity is very low.

The potential for any use other than wildlife habitat is very low because of the properties of gypsum itself. It is saline and supports only limited native vegetation. The material dissolves when wet and has low strength. Corrosion of concrete, steel pipe, and underground lines is common. Protective methods are necessary.

The potential for wildlife habitat is low. Since Gypsum land cannot be irrigated, it provides only limited sites for scaled and Gambel quail and mourning and white-winged dove.

GyE—Gypsum land, 9 to 35 percent slopes. This high detail map unit consists of unconsolidated gypsiferous sediments of lacustrine and eolian origin. It is on moderately sloping to steep actively eroding sides of drainageways. Areas are elongated and conform to drainage patterns in the area. Individual areas are 20 to 150 acres in size.

Typically, the gypsum is more than 60 inches thick. The exposed material is soft or is slightly hard where reaction with water has caused some cementation. As much as 2 inches of eolian material has been deposited on the surface near the fringe of mapped areas where slopes are less steep.

Included in mapping are a few intermingled areas of Holloman and Alamogordo soils. These soils have slopes of 1 to 9 percent and have a very fine sandy loam surface layer.

Gypsum land is calcareous throughout. Available water capacity is very low.

The potential for any use other than wildlife habitat is very low. The properties of gypsum and the slope make areas of this unit unsuitable for any use that requires alteration of the site. The surface is generally very unstable and erodes easily. It is saline and supports only limited native grasses or shrubs. Since the gypsum dissolves in water, it is unsuitable for building material.

The potential for wildlife habitat is low. Because of slope and limited area of plant-supporting soil, the establishment of any irrigated crops or shrubs is almost impossible. Scaled and Gambel quail and mourning and white-winged dove use the area at times.

HbA—Holloman very fine sandy loam, 0 to 1 percent slopes. This shallow, well drained, nearly level soil formed in eolian and alluvial material on bottom lands. Slopes are smooth. Individual areas are elongated and irregular in shape and are 15 to 60 acres in size. The elongated areas are generally oriented northeast-southwest.

Typically, the soil is very pale brown very fine sandy loam to a depth of 13 inches. Below that, it is very pale brown and white gypsum to a depth of more than 60 inches.

Included with this soil in mapping are intermingled small areas of eroded Holloman soils. A few narrow drainageways are also included. Inclusions make up less than 10 percent of this unit. Individual areas are generally about 1 acre in size.

This soil is calcareous throughout. Permeability is moderate, and available water capacity is very low. Tilth is

good, and the soil can be worked over a moderately wide range of moisture conditions.

This soil has low potential for row crops and small grains. Because the underlying gypsum restricts rooting depth, crops on this soil require frequent irrigation. This soil has low to moderate potential for adapted hay and pasture plants if ample water can be applied. Good tilth is easily maintained by returning crop residue to the soil. The hazard of wind erosion is moderate if row crops are grown. Cover crops, such as grasses, and minimum tillage reduce wind erosion.

This soil has low potential for windbreak species, because if the soil is irrigated, the gypsum tends to dissolve and support for the tree is lost. Onsite investigation is needed to determine what adapted species, if any, can be grown. Special site preparation is necessary.

This soil has low to moderate potential for most urban uses. Low strength can be overcome by proper design and careful installation. The shallow depth to gypsum limits septic tank absorption fields because of the hazard of polluting ground water as the gypsum dissolves away. Also, the soil is subject to piping and caving. Stock ponds should be lined to reduce water loss. Some areas are subject to flooding. Onsite investigation is necessary for many uses.

The potential for wildlife habitat is low. This soil produces only limited pasture, hay, orchards, and row crops that provide food and some cover for a variety of wildlife, including scaled and Gambel quail and mourning and white-winged dove. Russian-olive, cottonwood, several shrub and forb species, and grasses planted along unlined irrigation ditches, fence rows, odd areas, and flood plains improve habitat. Protected strip plantings of grain or green forage also provide food and cover.

HcA—Holloman-Gypsum land complex, 0 to 1 percent slopes. This complex consists of areas of deep, well drained Holloman soil and Gypsum land on uplands. These areas are so intermingled that it was not feasible to separate them on the high detail map. Areas of this complex are elongated and irregular in shape and are 60 to 300 acres in size. Individual areas of the components are 1 to 3 acres in size.

Holloman very fine sandy loam makes up about 45 percent of this complex. Typically, the upper 6 inches of the soil is pinkish gray very fine sandy loam. Below that, the soil is white gypsum to a depth of more than 60 inches.

This soil is calcareous throughout and is mildly alkaline to moderately alkaline. Permeability is moderate, and available water capacity is very low.

Gypsum land makes up about 40 percent of this complex. It consists of unconsolidated gypsum to a depth of more than 60 inches. In places the surface layer is slightly hard and cemented.

Gypsum land is saline. Only adapted native grasses and shrubs will grow. Available water capacity is very low.

Included in mapping are small intermingled areas of Holloman soils that have a thicker surface layer, Alamogordo soils, and Yesum soils. These soils are generally on the edge of the unit adjacent to areas mainly of deeper soils. These inclusions make up about 15 percent of this complex.

The potential of this complex for farming is very low. The thin surface layer of the Holloman soil and the Gypsum land make the complex unsuitable for crops or hay or pasture. Some isolated pockets of deeper included soils could be farmed, but onsite investigation is necessary to determine the kind and extent of these soils.

This complex has very low potential for windbreak species. Onsite investigation is needed to determine what adapted species, if any, can be grown. Special site preparation is necessary.

The potential of this complex for urban use is very low. Low strength, solubility of the gypsum, corrosivity, and salinity restrict most urban uses. Care is needed in planning any land use change on areas of this complex. The permeability limits septic tank absorption fields because the gypsum can dissolve away, leaving pits under the tile lines creating a hazard of polluting ground water. Stock ponds and other water storage facilities should be lined with plastic to reduce water loss.

This soil produces only limited pasture, hay, orchards, and row crops that provide food and some cover for a variety of wildlife, including scaled and Gambel quail and mourning and white-winged dove. Russian-olive, cottonwood, several shrub and forb species, and grasses planted along unlined irrigation ditches, fence rows, odd areas, marshy sites, and flood plains improve habitat. Protected strip plantings of grain or green forage also provide food and cover.

LbB—Largo sandy loam, 1 to 3 percent slopes. This deep, well drained, very gently sloping soil is adjacent to major intermittent drainage channels. Slopes are smooth and slightly concave. Many small gullies dissect the unit. Individual areas are irregular in shape and are 15 to 45 acres in size.

Typically, the surface layer is stratified reddish brown sandy loam about 10 inches thick. This layer was deposited when the area was subject to overflow by water that was carrying sediment. The next layer is reddish brown silty clay loam about 17 inches thick. The substratum is light reddish brown silty clay loam to a depth of more than 60 inches.

Included with this soil in mapping are areas of Largo very fine sandy loam, Largo silt loam, McCullough sandy loam, and Torrifluvents. The included soils make up about 20 percent of the unit. Individual areas are generally smaller that 1 acre.

This soil is calcareous throughout. Permeability is moderately slow, and available water capacity is high. Tilth is good and the soil can be worked over a wide range of moisture conditions. The root zone is deep and can easily be penetrated by roots.

This soil has high potential for row crops, small grains, pasture, and hay. Tilth can be maintained by returning crop residue to the soil. The wind erosion hazard is moderate to severe where the plant cover has been disturbed. Runoff is moderatley slow, and the hazard of water erosion is slight. Minimum tillage, cover crops, stripcropping, and windbreaks decrease these hazards. Low areas adjacent to drainage channels need protection from overflow water.

This soil has high potential for adapted windbreak species. Trees such as Arizona cypress, Rocky Mountain juniper, green ash, Siberian elm, and Russian-olive and the shrubs squawbush, lilac, and American plum can be grown with little or no difficulty.

Corrosion of underground utilities is a moderate limitation that can be overcome by using noncorrodible materials. The moderately slow permeability limits septic tank absorption fields but can be overcome by increasing the size of the absorption area or by modifying the filter field.

The potential for wildlife habitat is high. This soil produces pasture, hay, orchards, and row crops that provide food and some cover for a variety of wildlife, including scaled and Gambel quail and mourning and white-winged dove. Russian-olive, cottonwood, several shrub and forb species, and grasses planted along unlined irrigation ditches, fence rows, odd areas, marshy sites, and flood plains improve habitat. Protected strip plantings of grain or green forage also provide food and cover.

LcA—Largo very fine sandy loam, thick surface, 0 to 1 percent slopes. This deep, well drained, nearly level soil is on broad, somewhat elongated alluvial fans and bottom lands. Slopes are smooth or slightly concave. Individual areas are 100 to more than 300 acres in size.

Typically, the surface layer is pale brown very fine sandy loam about 5 inches thick. The next layer is reddish gray loam about 8 inches thick. This layer contains snail shells and travertine. The next layer, a buried surface layer of an older soil, is light reddish brown silt loam about 6 inches thick. The next layer is reddish brown silt loam to a depth of more than 60 inches.

Included with this soil in mapping are small areas of Prelo and Tome soils. These soils make up about 25 percent of this mapping unit. Also included are areas of Alamogordo soils and some wind hummocks. These inclusions make up about 10 percent of the unit. The hummocks occur in only a few areas.

This soil is moderately alkaline. Permeability is moderately slow, and available water capacity is high. The root zone is deep and easily penetrated by plant roots. Tilth is easily maintained by minimum tillage.

This soil has high potential for row crops and small grains, and high yields can be obtained under good management. Irrigation is necessary for farming because of the small amount of natural rainfall. The rainfall for irrigated pasture and adapted hay is high. Tilth can be maintained by returning crop residue to the soil. The hazard of wind erosion is moderate if this soil is cultivated. Minimum tillage and cover crops, including grasses and legumes, reduce runoff and water and wind erosion.

This soil has high potential for adapted windbreak species. Trees such as Arizona cypress, Rocky Mountain juniper, green ash, Siberian elm, and Russian-olive and the shrubs squawbush, lilac, and American plum can be grown with little or no difficulty.

This soil has moderate to high potential for most urban uses. The low strength, compressibility, moderate shrink-swell potential, and susceptibility to piping, can be overcome by using suitable fill material for foundations and by good design and careful installation. The moderately slow permeability limits septic tank absorption fields but can be overcome by increasing the size of the absorption area or by modifying the filter field itself. Corrosion of underground utilities is a moderate limitaton that can be overcome by using noncorrodible materials such as plastic or copper pipe.

This soil has high potential for wildlife habitat. This soil produces pasture, hay, orchards, and row crops that provide food and some cover for a variety of wildlife, including scaled and Gambel quail and mourning and white-winged dove. Russian-olive, cottonwood, several shrub and forb species, and grasses planted along unlined irrigation ditches, fence rows, odd areas, marshy sites, and flood plains improve habitat. Protected strip plantings of grain or green forage also provide food and cover.

LdA—Largo silt loam, 0 to 1 percent slopes. This deep, well drained, nearly level soil is on a broad, somewhat dissected basin floor. Slopes are smooth and convex. Individual areas are 15 to 100 acres in size.

Typically, the surface layer is reddish brown silt loam about 4 inches thick. The next layer is reddish brown silty clay loam about 17 inches thick. The substratum is light reddish brown and reddish brown silty clay loam to a depth of more than 60 inches.

Included with this soil in mapping are small intermingled areas of Prelo and Alamogordo soils. Also included are very small areas of wind hummocks less than 36 inches high. The included soils make up about 15 percent of the unit. Individual areas are generally smaller than 3 acres.

This soil is calcareous throughout. In some areas small amounts of gypsum are in the lower part of the substratum. Permeability is moderately slow, and available water capacity is high. Tilth is moderate, and the soil

can be worked over a moderate range of moisture conditions. The root zone is deep and easily penetrated by plant roots.

This soil has high potential for row crops, orchards, and small grains if the soil is irrigated and if good management is practiced (fig. 11). This soil has high potential for irrigated pasture and hay. Tilth can be improved and maintained by returning crop residue to the soil and by growing green manure crops in the cropping system. The erosion hazard is severe if cultivated crops are grown. Minimum tillage, cover crops, and windbreaks reduce runoff and erosion.

This soil has high potential for adapted windbreak species. Trees such as Arizona cypress, Rocky Mountain juniper, green ash, Siberian elm, and Russian-olive and the shrubs squawbush, lilac, and American plum can be grown with little or no difficulty.

This soil has high potential for most urban uses. Low strength, compressibility, moderate shrink-swell potential, and susceptibility to piping can be overcome by use of suitable fill material for foundations and by good design and careful installation. The moderately slow permeability limits septic tank absorption fields but can be overcome by increasing the size of the absorption area or by modifying the filter field. Corrosion of underground utilities is a moderate limitation but can be overcome by using noncorrodible materials.

This soil has high potential for wildlife habitat. This soil produces pasture, hay, orchards, and row crops that provide food and some cover for a variety of wildlife, including scaled and Gambel quail and mourning and white-winged dove. Russian-olive, cottonwood, several shrub and forb species, and grasses planted along unlined irrigation ditches, fence rows, odd areas, marshy sites, and flood plains improve habitat. Protected strip plantings of grain or green forage also provide food and cover.

LdB—Largo silt loam, 1 to 3 percent slopes. This deep, well drained soil is on lower parts of toe slopes of pediments. Slopes are smooth and slightly concave. Individual areas are 10 to 60 acres in size.

Typically, the surface layer is reddish brown silt loam about 5 inches thick. The next layer is reddish brown silty clay loam about 20 inches thick. The substratum is light reddish brown silty clay loam to a depth of more than 60 inches.

Included with this soil in mapping are small intermingled areas of Prelo and Alamogordo soils. Also included are a few areas of Largo silt loam, frequent overflow, and McCullough fine sandy loam. Included soils make up about 20 percent of the unit. Individual areas are smaller than 3 acres.

This soil is calcareous throughout. In some areas small amounts of gypsum are in the lower part of the substratum. Permeability is moderately slow, and available water capacity is high. Tilth is poor, and the soil can be worked only over a narrow range of moisture conditions. The root zone is deep and is easily penetrated by plant roots.

This soil has high potential for farming. High yields can be expected from most crops under good management. The silt loam surface has a tendency to seal over when wet. This lowers the infiltration rate and increases erosion potential. Good irrigation water management is necessary to avoid excessive loss of water and to control erosion if row crops or small grains are grown. Minimum tillage, cover crops, stripcropping, and windbreaks reduce runoff and erosion. Tilth can be maintained by growing green manure crops and by returning crop residue to the soil. Commercial fertilizer increases yields of all crops.

This soil has high potential for adapted windbreak species. Trees such as Arizona cypress, Rocky Mountain juniper, green ash, Siberian elm, and Russian-olive and the shrubs squawbush, lilac, and American plum can be grown with little or no difficulty.

This soil has high potential for urban uses. The moderately slow permeability limits septic tank absorption fields. Modifying the design of the filter field or increasing the size of the absorption area overcomes this problem. Central waste disposal would also eliminate the problem. This soil has a moderate shrink-swell potential and low strength, which limit small buildings, dwellings, and local roads and streets. Good design, careful installation, and the use of suitable fill material help to overcome these problems. Some areas need to be protected from runon water from surrounding areas. This soil is susceptible to piping, has low strength, and erodes easily. Care is needed in building water retarding or water holding structures. To reduce wind and water erosion, a mulch should be maintained on all disturbed areas, such as lawns or rights-of-way for roads, until a plant cover is established.

The potential for wildlife habitat is high. This soil produces pasture, hay, orchards, and row crops that provide food and some cover for a variety of wildlife, including scaled and Gambel quail and mourning and white-winged dove. Russian-olive, cottonwood, several shrub and forb species, and grasses planted along unlined irrigation ditches, fence rows, odd areas, marshy sites, and flood plains improve habitat. Protected strip plantings of grain or green forage also provide food and cover.

LdB2—Largo silt loam, 1 to 3 percent slopes, eroded. This deep, well drained, nearly level to very gently sloping soil is on lower parts of pediment toe slopes that are dissected by many rills and shallow gullies. Slopes are smooth and slightly concave. Individual areas are irregular in shape and are 10 to 25 acres in size.

Typically, the surface layer has been eroded and is much thinner than in most Largo soils. It is reddish brown silt loam about 1 inch thick. The next layer is silty

clay loam about 20 inches thick. The substratum is light reddish brown silty clay loam that extends to a depth of more than 60 inches. A few small soft masses of gypsum are in the lower part of the substratum.

Included with this soil in mapping are small areas of Largo very fine sandy loam, Largo sandy loam, McCullough soils, and Alamogordo soils. On all of the included soils, some of the surface layer has been removed by water. The included soils make up about 15 percent of the unit. Individual areas are generally smaller than 2 acres.

This soil is calcareous throughout. In some areas small amounts of gypsum are in the lower part of the substratum. Permeability is moderately slow, and the available water capacity if high. Tilth is poor, and the soil can be worked only over a narrow range of moisture conditions. The root zone is deep and is easily penetrated by plant roots.

The potential for farming is not so good for these soils as for the typical Largo soils. The thinness of the surface layer restricts production of most crops. The silt loam surface layer seals over and reduces infiltration. This increases runoff, causing more erosion. Cover crops, green manure crops, and pasture or hay crops reduce erosion and improve tilth. The areas should be protected from runon water from surrounding areas by diversions or terraces. Since this soil is susceptible to piping, has low strength, and erodes easily, care should be taken when building any type of water retarding or water holding structures. Commercial fertilizer increases yields of cultivated crops.

This soil has high potential for adapted windbreak species. Trees such as Arizona cypress, Rocky Mountain juniper, green ash, Siberian elm, and Russian-olive and the shrubs squawbush, lilac, and American plum can be grown with little or no difficulty.

This soil has moderate potential for most urban uses if it is protected from runon water. The moderately slow permeability limits septic tank filter fields but can be overcome by increasing the size of the absorption area or modifying the filter field. The moderate shrink-swell potential moderately limits dwellings, small buildings, and local roads and streets but can be overcome by good design and careful installation and by use of suitable fill material. To reduce wind and water erosion, a mulch should be maintained on all disturbed areas, such as lawns and rights-of-way for roads, until a plant cover is eatablished.

The potential of this soil for wildlife habitat is high. If protected from runon water, this soil produces pasture, hay, orchards, and row crops that provide food and some cover for a variety of wildlife, including scaled and Gambel quail and mourning and white-winged dove. Russian-olive, cottonwood, several shrub and forb species, and grasses planted along unlined irrigation ditches, fence rows, odd areas, marshy sites, and flood plains improve habitat. Protected strip plantings of grain or green forage also provide food and cover.

LeA—Largo silt loam, frequent overflow, 0 to 1 percent slopes. This deep, well drained, nearly level soil is on lower parts of toe slopes of pediments. This soil receives excess water from surrounding areas. Slopes are smooth and slightly concave. Individual areas are 10 to 80 acres in size.

Typically, the surface layer is highly stratified silt loam and silty clay loam about 12 inches thick. The dominant texture is silt loam. This layer was deposited by overflow water. The next layer is reddish brown silt loam about 10 inches thick. The substratum is reddish brown silt loam to a depth of more than 60 inches.

Included with this soil in mapping are small intermingled areas of Prelo silt loam and Largo very fine sandy loam. Also included are a few small areas of McCullough soils. All of the included soils are stratified in the upper few inches. Included soils make up about 15 percent of the unit. Individual areas are generally smaller than 3 acres.

This soil is calcareous throughout. In some areas small amounts of gypsum are in the substratum. Permeablity is moderately slow, and available water capacity is high. Tilth is good, and the soil can be worked over a moderate range of moisture conditions. The root zone is deep and is easily penetrated by plant roots.

The potential for farming is high if the soils are protected from runon water from surrounding areas. Dikes of diversions provide such protection. Good tilth is easily maintained by growing green manure crops and returning crop residue to the soil. Because of the moderately slow permeability, good irrigation water management is required to prevent ponding in depressional areas. Minimum tillage, cover crops, stripcropping, and windbreaks reduce runoff and water and wind erosion. Commercial fertilizer increases yields of all crops.

This soil has high potential for adapted windbreak species. Trees such as Arizona cypress, Rocky Mountain juniper, green ash, Siberian elm, and Russian-olive and the shrubs squawbush, lilac, and American plum can be grown with little or no difficulty.

The potential for most urban uses is low. This soil must be protected from runon water from surrounding areas before use in urban areas. The moderately slow permeability limits septic tank absorption fields but can be overcome by modifying the design of the filter field or increasing the size of the absorption area. Central waste disposal would also eliminate the problem. This soil has a moderate shrink-swell potential, which limits small buildings, dwellings, and local roads and streets but can be overcome by good design, careful installation, and use of suitable fill material. This soil is susceptible to piping, has low strength, and erodes easily. Care is needed in building water retarding and water holding structures. To reduce wind and water erosion, a mulch

should be maintained on all disturbed areas, such as lawns and rights-of-way of roads, until a plant cover is established.

The potential of this soil for wildlife is high. This soil produces pasture, hay, orchards, and row crops that provide food and some cover for a variety of wildlife, including scaled and Gambel quail and mourning and white-winged dove. Russian-olive, cottonwood, several shrub and forb species, and grasses planted along unlined irrigation ditches, fence rows, odd areas, marshy sites, and flood plains improve habitat. Protected strip plantings of grain or green forage also provide food and cover.

LfB—Largo-Ogral complex, 1 to 3 percent slopes. This complex consists of medium-sized areas of deep, well drained soils on nearly level to very gently sloping pediments that are slightly lower than the surrounding landscape. The soils are so intermingled that it was not feasible to separate them on the high detail map. Areas of this complex are elongated and are 60 to 350 acres in size. Individual areas of each soil are generally smaller than 3 acres.

Largo very fine sandy loam makes up 55 percent of each mapped area. Typically, the surface layer is reddish brown very fine sandy loam about 6 inches thick. The next layer is reddish brown silt loam about 19 inches thick. The substratum is reddish brown silty clay loam to a depth of more than 60 inches.

This soil is strongly calcareous throughout. Permeability is moderately slow, and available water capacity is high. The root zone is deep and when moist is easily penetrated by plant roots.

Ogral very fine sandy loam makes up about 30 percent of each mapped area. Typically, the surface layer is reddish brown very fine sandy loam about 6 inches thick. The next layer is reddish brown fine sandy loam about 12 inches thick. The substratum is reddish brown very gravelly fine sandy loam to a depth of more than 60 inches. In about 70 percent of the mapped area, 30 percent of the surface is covered by a gravelly desert pavement.

This soil is strongly calcareous throughout. Permeability is moderately rapid, and available water capacity is low. The root zone is deep and can be penetrated by roots of most plants.

Included in mapping are small areas of Emot, Tome, and Alamogordo Variant soils and Largo sandy loam. Inclusions make up about 15 percent of the unit. Individual areas are generally smaller than 2 acres.

This complex has low potential for farming because of the low available water capacity of the Ogral soil. The complex pattern of the Largo and Ogral soils makes it very difficult to properly manage irrigation water. Small areas of irrigated pasture or hay are more suitable for this complex than fields of most row crops. Commercial fertilizer increases yields. The water erosion hazard is severe if these soils are disturbed.

Increased population growth and development of small ranchettes has increased urbanization. The moderate shrink-swell potential and low strength of the Largo soils limit dwellings and local roads and streets but can be overcome by good design and careful installation and by use of suitable fill material. The moderately slow permeability of the Largo soils limits septic tank filter fields but can be overcome by increasing the size of the filter field or modifying the design. Filter fields are not restricted in the Ogral soils, but because of the gravelly substratum, underground water may be contaminated.

These soils have moderate potential for adapted windbreak species. Trees such as Arizona cypress, Rocky Mountain juniper, green ash, Siberian elm, and Russian-olive and the shrubs squawbush, lilac, and American plum can be grown with little or no difficulty. Some other species can be grown, but special treatment is required to overcome specific soil conditions.

The potential of this complex for wildlife habitat is moderate. The soils produce limited pasture, hay, orchards, and row crops that provide some food and some cover for a variety of wildlife, including scaled and Gambel quail and mourning and white-winged dove. Russian-olive, cottonwood, several shrub and forb species, and grasses planted along unlined irrigation ditches, fence rows, odd areas, marshy sites, and flood plains improve habitat. Protected strip plantings of grain or green forage also provide food and cover.

McB—McCullough sandy loam, 1 to 3 percent slopes. This deep, well drained, very gently sloping soil is on lower parts of toe slopes of pediments. Slopes are smooth and slightly concave. Individual areas are 20 to 150 acres in size.

Typically, the surface layer is reddish brown sandy loam about 5 inches thick. The next layer is reddish brown fine sandy loam about 17 inches thick. The upper 7 inches of the substratum is reddish brown very gravelly coarse sand. Below that, the substratum is reddish brown fine sandy loam to a depth of more than 60 inches.

Included with this soil in mapping are some areas of McCullough fine sandy loam. Also included are small intermingled areas of Largo, Prelo, Alamogordo, and Holloman soils. Small wind hummocks are randomly scattered over the unit. Many shallow drainageways dissect the unit. These drainageways are mostly less than 12 inches deep and are very gravelly. The included soils make up about 30 percent of this unit.

This soil is calcareous throughout. The lower part of the substratum has a few, small, soft masses of gypsum. Permeability is moderately rapid, and available water capacity is moderate. Tilth is good and the soil can be worked over a wide range of moisture conditions. The root zone is deep and is easily penetrated by plant roots.

This soil has high potential for farming. The potential for irrigation is limited by rapid percolation and moderate available water capacity. Pasture and hay have higher potential than most cultivated crops. The hazard of wind erosion is very severe if this soil is disturbed or if the plant cover is removed. If row crops or small grains are grown, good tilth can be maintained by growing green manure crops and by returning crop residue to the soil. Minimum tillage, cover crops, stripcropping, and windbreaks reduce runoff and water and wind erosion. Commercial fertilizer increases the yields of all crops.

This soil has moderate potential for adapted windbreak species. Trees such as Arizona cypress, Rocky Mountain juniper, green ash, Siberian elm, and Russian-olive and the shrubs squawbush, lilac, and American plum can be grown with little or no difficulty, but more frequent irrigation is necessary than for most soils because of the low water holding capacity. Other species can be grown, but special treatment is required to overcome specific soil conditions.

This soil has high potential for most urban uses. Septic tank absorption fields work well in this soil, but if the population density becomes too high, contamination of ground water and seepage at the lower elevations are possible. Central sewage systems would eliminate the problem. These areas should be protected from runon water from surrounding areas. To reduce wind erosion, a mulch should be maintained on all areas, such as lawns and rights-of-way for roads, until a plant cover is established.

The potential for wildlife habitat is high to moderate. This soil produces pasture, hay, orchards, and row crops that provide food and some cover for a variety of wildlife, including scaled and Gambel quail and mourning and white-winged dove. Russian-olive, cottonwood, several shrub and forb species, and grasses planted along unlined irrigation ditches, fence rows, odd areas, marshy sites, and flood plains improve habitat. Protected strip plantings of grain or green forage also provide food and cover.

MdA—McCullough Variant very fine sandy loam, 0 to 1 percent slopes. This deep, well drained, nearly level soil is on lower pediment toe slopes. Slopes are smooth and slightly concave. Individual areas are irregular in shape and are 10 to 50 acres in size.

Typically, the surface layer is light brown very fine sandy loam about 7 inches thick. The next layer is light brown loam about 8 inches thick. The upper 17 inches of the substratum is light brown very fine sandy loam. Below that, the substratum is reddish brown silt loam to a depth of more than 60 inches. A few fine soft masses of gypsum are in the lower part of the substratum.

Included with this soil in mapping are areas of Largo, McCullough, and Prelo soils. Also included are a few intermingled areas of Alamogordo and Aztec soils. Torrifluvents are in the bottoms of the major drainageways, and a few wind hummocks are scattered throughout the unit. The wind hummocks are generally less than 36 inches high. The included soils make up about 20 percent of the unit. Individual areas are generally smaller than 1 acre.

This soil is calcareous throughout. Small amounts of gypsum are in the lower part of the substratum. Permeability is moderately slow, and available water capacity is high. Tilth is good, and the soil can be worked over a moderate range of moisture conditions. The root zone is deep and is easily penetrated by plant roots.

This soil has high potential for row crops, small grains, and irrigated pasture and hay. Good tilth can be maintained by returning crop residue to the soil and by growing green manure crops in the cropping system. Generally, nitrogen is needed by all crops except legumes. Legumes respond to phosphate. The hazard of wind erosion is severe if these soils are cultivated, especially in spring, when strong winds are common. Minimum tillage, cover crops, stripcropping, and windbreaks reduce runoff and wind erosion.

This soil has high potential for windbreak species. Trees such as Arizona cypress, Rocky Mountain juniper, green ash, Siberian elm, and Russian-olive and the shrubs squawbush, lilac, and American plum can be grown with little or no difficulty.

This soil has high potential for urban development. The moderately slow permeability limits septic tank filter fields but can be overcome by increasing the size of the absorption area or modifying the filter field. Central waste disposal would eliminate the problem. Moderate shrink-swell potential limits dwellings with basements and local roads and streets but can be overcome by careful installation and by use of suitable fill material. To reduce wind and water erosion, a mulch should be maintained on all disturbed areas, such as lawns or rights-of-way for roads, until a plant cover is established.

The potential for wildlife habitat is high. This soil produces pasture, hay, orchards, and row crops that provide food and some cover for a variety of wildlife, including scaled and Gambel quail and mourning and white-winged dove. Russian-olive, cottonwood, several shrub and forb species, and grasses planted along unlined irrigation ditches, fence rows, odd areas, marshy sites, and flood plains improve habitat. Protected strip plantings of grain or green forage also provide food and cover.

NaC—Nickel-Aztec gravelly sandy loams, 2 to 8 percent slopes. This complex consists of large areas of deep, well drained soils on the upper part of the pediments. These soils are so intermingled that it was not feasible to separate them on the high detail map. This complex is mainly in one large area about a mile wide on the dissected fans on pediments adjacent to the escarpments of the Sacramento Mountains. The pediment has been truncated. Gullies cut by fast flowing streams are

common. Slopes are undulating to gently rolling. The sides of the drainageways are as steep as 30 percent. Individual areas of each soil are generally smaller than 3 acres.

Nickel gravelly sandy loam makes up about 70 percent of each mapped area. Typically, the surface layer is light yellowish brown gravelly sandy loam about 4 inches thick. The upper 14 inches of the substratum is very pale brown and white very gravelly sandy loam that contains some accumulations of gypsum. Below that, the substratum is very pale brown very gravelly sandy loam to a depth of more than 60 inches.

This soil is strongly calcareous throughout and is moderately alkaline. Permeability is moderately slow, and available water capacity is low.

Aztec gravelly sandy loam makes up about 20 percent of each mapped area. Typically, the surface layer is brown gravelly sandy loam about 6 inches thick. The upper 20 inches of the substratum is pinkish white gravelly sandy loam that is high in gypsum. Below that, the substratum is light brown very gravelly sandy loam to a depth of more than 60 inches.

This soil is calcareous throughout and is high in gypsum. Permeability is moderately rapid below a depth of 26 inches, and available water capacity is low.

Included in mapping are small intermingled areas of Emot, Alamogordo, Lozier, McCullough, and Tome soils. The Emot and Tome soils are in the lower, western-most portions of the pediments along the level areas adjacent to the narrow, deep drainageways. The McCullough and Alamogordo soils are along the side slopes and level benches adjacent to the drainageways. The Lozier soils are on the upper part of the pediments. Inclusions make up about 10 percent of the unit. Individual areas are generally smaller than 1 acre.

This complex has no potential for farming. The gravel content and slope limit all uses except native range and wildlife habitat. Water erosion is a hazard if these soils are disturbed.

These soils have low potential for adapted windbreak species. Trees such as Arizona cypress, Rocky Mountain juniper, green ash, Siberian elm, and Russian-olive and the shrubs squawbush, lilac, and American plum can be grown, but special treatment is required to overcome specific soil conditions.

This complex has low potential for most urban uses; nevertheless, some urban development is taking place on these soils. The gravel content severely limits septic tank filter fields by allowing contamination of ground water or causing seepage downslope. Slope is a minor limitation for north-south roads or streets. This complex is a good source of gravel and fill material.

The potential for wildlife habitat is low. This complex produces only limited pasture and hay that provide some food and some cover for a variety of wildlife, including scaled and Gambel quail and mourning and white-winged dove. This complex is not generally irrigated. Russian-olive, several shrub and forb species, and grasses planted along unlined irrigation ditches, fence rows, and odd areas improve habitat. Protected strip plantings of grain or green forage also provide food and cover.

PkA—Prelo sandy loam, hummocky, 0 to 1 percent slopes. This deep, well drained, nearly level soil is at the end of drainage channels and intermittent streams. Slopes are smooth and slightly concave. Individual areas are irregular and elongated and are 30 to 100 acres in size. Small gullies less than 12 inches deep dissect the unit.

Typically, the upper 10 inches of the surface layer is reddish brown and highly stratified. Texture varies from sand to silt loam, but is dominantly sandy loam. This layer was deposited by water. The lower 4 inches of the surface layer is dark reddish brown silt loam. The subsoil is about 24 inches thick. The upper part of the subsoil is reddish brown silty clay loam, and the lower part is dark reddish brown silty clay loam. The substratum is reddish brown silty clay loam to a depth of more than 60 inches. The subsoil and the substratum contain common, white, soft masses and filaments of gypsum.

Included with this soil in mapping are areas of hummocky Prelo soils that have various textures in the surface layer, gravelly and sandy soils in drainage channels, Alamogordo fine sandy loam, and Prelo silt loam, eroded. The included soils make up about 30 percent of the unit, and individual areas are generally smaller than 2 acres. The wind hummocks cover about 15 percent of the area and are typically 36 inches or less high.

This soil is calcareous throughout. Gypsum content increases with depth. Permeability is moderately slow, and available water capacity is high. Tilth is good, and the soil can be worked over a moderate range of moisture conditions. The root zone is deep and is easily penetrated when moist.

Because of the wind hummocks, this soil has low potential for farming. If the wind hummocks are leveled, the potential is high for row crops, small grains, pasture, and hay. The moderately slow permeability of the soil limits farming unless good irrigation water management is practiced. Tilth can be maintained by returning crop residue to the soil and growing green manure crops in the cropping system. The hazard of wind erosion is severe if cultivated crops are grown. During intensive storms, the soil has a severe hazard of erosion by overflow water from intermittent drainageways. The overflow water carries sediment which is deposited on the soil. Diversions or dikes can be used to keep out runon water from surrounding areas. Minimum tillage, cover crops, stripcropping, and windbreaks help to control wind erosion.

This soil has high potential for adapted windbreak species. Trees such as Arizona cypress, Rocky Mountain juniper, green ash, Siberian elm, and Russian-olive and

the shrubs squawbush, lilac, and American plum can be grown with little or no difficulty. If the wind hummocks are leveled, this soil has high potential for pecans under irrigation and good management.

The soil has high potential for most urban uses if the hummocks are leveled. Low strength, moderate shrink-swell potential, and susceptibility to piping can be overcome by use of suitable fill material, good design, and careful installation. Using noncorrodible materials in underground utilities eliminates the severe hazard of corrosion. Septic tank adsorption fields are limited by the moderately slow permeability of the subsoil and substratum. By increasing the size of the absorption area or modifying the filter field, this limitation can be overcome.

The potential for wildlife habitat is high to moderate. This soil produces pasture, hay, orchards, and row crops that provide food and some cover for a variety of wildlife, including scaled and Gambel quail and mourning and white-winged dove. Russian-olive, cottonwood, several shrub and forb species, and grasses planted along unlined irrigation ditches, fence rows, odd areas, marshy sites, and flood plains improve habitat. Protected strip plantings of grain or green forage also provide food and cover.

PlA—Prelo fine sandy loam, 0 to 1 percent slopes. This deep, well drained, nearly level soil is on broad alluvial toe slopes. Slopes are smooth and slightly concave. Individual areas are generally elongated or irregular in shape and are 20 to 200 acres in size. The areas are mostly oriented northeast-southwest.

Typically, the surface layer is light brown fine sandy loam about 4 inches thick. The subsoil is reddish brown and brown silt loam about 22 inches thick. The upper part of the substratum is light reddish brown silt loam and contains accumulations of gypsum. The lower part is reddish brown clay loam to a depth of more than 60 inches.

Included with this soil in mapping are some areas of Prelo soils that have a silt loam or very fine sandy loam surface layer. Also included are small intermingled areas of Largo, Alamogordo, and Aztec soils. In the larger mapped areas, there are usually shallow, narrow drainageways. The soils in these drainageways have a gravelly surface layer, and some are gravelly throughout. In some areas slope is as much as 2 percent. The included soils make up about 20 percent of the unit. Individual areas are smaller than 3 acres.

This soil is calcareous throughout and contains a moderate amount of gypsum. Permeability is moderately slow, and available water capacity is high. Tilth is poor except where good cropping systems are used. Normally this soil can be worked only over a narrow range of moisture conditions. The root zone is deep and is easily penetrated by plant roots.

The soil has medium to high potential for row crops, small grains, hay, and pasture (fig. 12). All crops need irrigation. High yields of irrigated pasture can be obtained under good management. Returning crop residue to the soil helps to maintain good tilth. The hazard of wind erosion is severe, especially in spring, when strong winds are common. Minimum tillage and cover crops reduce runoff and wind and water erosion. Some areas need dikes or diversions to keep out excessive runon water from surrounding areas.

This soil has high potential for adapted windbreak species. Trees such as Arizona cypress, Rocky Mountain juniper, green ash, Siberian elm, and Russian-olive and the shrubs squawbush, lilac, and American plum can be grown with little or no difficulty.

The soil has high potential for most urban uses. Low strength and moderate shrink-swell potential are moderate limitations but can be overcome by good design and careful installation. The moderately slow permeability limits septic tank absorption fields but can be overcome by increasing the size of the absorption area or by modifying the filter field itself. The amount of gypsum in the substratum limits pit tanks and other water holding structures, but this limitation can be overcome by several methods of lining.

This soil has high potential for wildlife habitat. This soil produces pasture, hay, orchards, and row crops that provide food and some cover for a variety of wildlife, including scaled and Gambel quail and mourning and white-winged dove. Russian-olive, cottonwood, several shrub and forb species, and grasses planted along unlined irrigation ditches, fence rows, odd areas, marshy sites, and flood plains improve habitat. Protected strip plantings of grain or green forage also provide food and cover.

PmA—Prelo silt loam, 0 to 1 percent slopes. This deep, well drained, nearly level soil is on the broad, somewhat dissected basin floor and on alluvial toe slopes (fig. 13). Slopes are smooth and slightly convex. Individual areas are 40 to 200 acres in size. A few major drainageways dissect the unit, and many smaller ones meander across the unit into the major drainageways.

Typically, the surface layer is reddish brown silt loam about 8 inches thick. In some areas the surface layer is 12 inches thick and has very thin platy structure or is very highly stratified. In these areas the surface layer was deposited by water and some of the very thin strata are clay loam. The subsoil is about 14 inches thick. The upper part of the subsoil is reddish brown silty clay loam, and the lower part is reddish brown silt loam. The subsoil contains common, white, soft masses and soft filaments of gypsum. The upper part of the substratum is reddish brown silt loam, and the lower part is light reddish brown silt loam to a depth of more than 60 inches. Content of gypsum in the form of small crystals and soft filaments increases with depth in the substratum.

Included with this soil in mapping are small areas of Prelo soils that are eroded or that are fine sandy loam

and sandy loam. Also included are a few intermingled areas of Alamogordo and Largo soils. Wind hummocks less than 30 inches high, are in some areas. Included soils make up about 20 percent of the unit. Individual areas are generally smaller than 2 acres.

This soil is calcareous throughout. Gypsum content increases with depth. Permeability is moderately slow, and available water capacity is high. Tilth is poor, and the soil can be worked only over a moderate range of moisture conditions. The root zone is deep and is easily penetrated by plant roots.

This soil has a high potential for row crops, small grains, irrigated pasture, and hay. The moderately slow permeability limits farming unless irrigation water is well managed. Tilth can be maintained by returning crop residue to the soil and growing green manure crops in the cropping system. The wind erosion hazard is severe if cultivated crops are grown, especially in spring, when strong winds are common. Minimum tillage, cover crops, stripcropping, and windbreaks reduce runoff and wind erosion. All crops except legumes respond to nitrogen. Legumes respond to phosphate.

This soil has high potential for adapted windbreak species. Trees such as Arizona cypress, Rocky Mountain juniper, green ash, Siberian elm, and Russian-olive and the shrubs squawbush, lilac, and American plum can be grown with little or no difficulty.

This soil has high potential for most urban uses. Low strength, moderate shrink-swell potential, and susceptibility to piping can be overcome by good design and careful installation and by use of suitable fill material for foundations. The gypsum in the substratum can corrode underground utilities, but the use of noncorrodible materials overcomes this limitation. The moderately slow permeability limits septic tank absorption fields but can be overcome by increasing the size of the absorption area or modifying the filter field itself.

The potential for wildlife habitat is high. This soil produces pasture, hay, orchards, and row crops that provide food and some cover for a variety of wildlife, including scaled and Gambel quail and mourning and white-winged dove. Russian-olive, cottonwood, several shrub and forb species, and grasses planted along unlined irrigation ditches, fence rows, odd areas, marshy sites, and flood plains improve habitat. Protected strip plantings of grain or green forage also provide food and cover.

PmB—Prelo silt loam, 1 to 3 percent slopes. This deep, well drained, very gently sloping soil is on the broad, somewhat dissected basin floor. Slopes are smooth and slightly convex. Individual areas are 60 to 150 acres in size. A few major drainageways dissect the unit, and many smaller ones meander across the unit into the major drainageways.

Typically, the surface layer is reddish brown silt loam 6 inches thick. The subsoil is about 14 inches thick. The upper part of the subsoil is reddish brown silty clay loam, and the lower part is reddish brown silt loam. The subsoil has common, white, soft masses and soft filaments of gypsum. The upper part of the substratum is reddish brown silt loam, and the lower part to a depth of more than 60 inches is reddish brown silt loam and contains crystals and soft filaments of gypsum.

Included with this soil in mapping are small areas of Prelo soils that are eroded or that are fine sandy loam and sandy loam. Also included are a few intermingled areas of Prelo silt loam, 0 to 1 percent slopes, and Alamogordo and Largo soils and a few wind hummocks. The included soils make up about 15 percent of the unit. Individual areas are generally smaller than 3 acres.

This soil is calcareous throughout. Gypsum content increases with depth. Permeability is moderately slow, and available water capacity is high. Tilth is poor, and the soil can be worked only over a moderate range of moisture conditions. The root zone is deep and when moist is readily penetrated by plant roots.

This soil has high potential for row crops, small grains, pasture, and hay if adequate water is available. The moderately slow permeability limits farming unless irrigation water is well managed. Tilth can be maintained by returning crop residue to the soil and growing green manure crops in the cropping system. The hazard of wind erosion is severe if cultivated crops are grown, especially in spring when strong winds are common. The water erosion hazard is moderate. Minimum tillage, cover crops, stripcropping, and the windbreaks reduce runoff and water and wind erosion.

This soil has high potential for most urban uses. Low strength, moderate shrink-swell potential, and susceptibility to piping can be overcome by good design and careful installation and by use of suitable fill material for foundations. The high amount of gypsum in the substratum can corrode underground utilities. Use of noncorrodible materials overcomes this limitation. The moderately slow permeability limits septic tank absorption fields but can be overcome by increasing the size of the absorption area or modifying the filter field.

The potential for wildlife habitat is high. This soil produces pasture, hay, orchards and row crops that provide food and some cover for a variety of wildlife, including scaled and Gambel quail and mourning and white-winged dove. Russian-olive, cottonwood, several shrub and forb species, and grasses planted along unlined irrigation ditches, fence rows, odd areas, marshy sites, and flood plains improve habitat. Protected strip plantings of grain or green forage also provide food and cover.

PmB2—Prelo silt loam, 1 to 3 percent slopes, eroded. This deep, well drained, very gently sloping soil is on the upper basin floor. Slopes are smooth and slightly concave. This unit has very little vegetation, commonly only creosotebush and mesquite on the wind hum-

mocks, and is dissected by many small rills and gullies that are generally less than 12 inches deep. Individual areas are irregular in shape and are 5 to 35 acres in size.

Typically, the surface layer is reddish brown silt loam about 2 inches thick. The subsoil is reddish brown clay loam about 6 inches thick. The substratum is reddish brown clay loam extending to a depth of more than 60 inches. Both the subsoil and the substratum have common soft masses and soft filaments of gypsum.

Included with this soil in mapping are small intermingled areas of other Prelo soils, Alamogordo and Largo soils, and wind hummocks that have a surface layer of very fine sandy loam, loam, and silt loam. The included soils make up about 25 percent of the unit. Individual areas are generally smaller than 2 acres. Commonly the wind hummocks are eroded, have a melted appearance, are as much as 30 inches high, and cover about 5 percent of the unit.

This soil is calcareous throughout. Gypsum content increases with depth. Permeability is moderately slow, and available water capacity is high. Tilth is poor, and the soil can be worked only over a narrow range of moisture conditions. The root zone is deep and is easily penetrated when moist.

The potential is high for row crops, small grains, pasture, and hay. The moderately slow permeability of the soil limits farming unless irrigation water is well managed. Tilth can be maintained by returning crop residue to the soil and growing green manure crops in the cropping system. The wind erosion hazard is severe if cultivated crops are grown, especially in spring, when strong winds are common. The water erosion hazard is also severe. Some areas need diversions or bench leveling to protect the soil from rapid runon from adjacent areas. Minimum tillage, cover crops, stripcropping, and windbreaks minimize runoff and water and wind erosion.

This soil has high potential for adapted windbreak species. Trees such as Arizona cypress, Rocky Mountain juniper, green ash, Siberian elm, and Russian-olive and the shrubs squawbush, lilac, and American plum can be grown with little or no difficulty.

This soil has high potential for most urban uses, if runon water is kept off this soil. Low strength, moderate shrink-swell potential, and susceptibility to piping can be overcome by good design, careful installation, and use of suitable fill materials for foundations. Corrosion of underground utilities is also a limitation. The use of noncorrodible materials overcomes this limitation. The moderately slow permeability limits septic tank absorption fields but can be overcome by increasing the size of the absorption area or modifying the filter field.

The potential for wildlife habitat is moderate. This soil produces pasture, hay, orchards, and row crops that provide food and some cover for a variety of wildlife, including scaled and Gambel quail and mourning and white-winged dove. Russian-olive, cottonwood, several shrub and forb species, and grasses planted along unlined irrigation ditches, fence rows, odd areas, marshy sites, and flood plains improve habitat. Protected strip plantings of grain or green forage also provide food and cover.

PnA—Prelo silt loam, hummocky, 0 to 1 percent slopes. This deep, well drained, nearly level soil is on the broad, somewhat dissected basin floor and alluvial toe slopes. Slopes are smooth and slightly convex. Individual areas are 20 to 150 acres in size. Small rills, less than 12 inches deep, commonly meander through the unit.

Typically, the upper 4 inches of the surface layer is reddish brown silt loam and the lower 4 inches is reddish brown silty clay loam. The subsoil is reddish brown silty clay loam about 20 inches thick. The subsoil has few soft masses and filaments of gypsum. The substratum is reddish brown silty clay loam to a depth of more than 60 inches. It contains common soft masses and filaments and few medium crystals of gypsum. Gypsum content increases with depth. In about 20 percent of the area of this unit, the surface layer is very fine sandy loam.

Included with this soil in mapping are small areas of other Prelo soils. Also included are small intermingled areas of Largo and Alamogordo soils and wind hummocks. The wind hummocks generally are less than 36 inches high and have a melted appearance. The included soils make up about 30 percent of this mapping unit.

This soil is calcareous throughout. Gypsum content increases with depth. Permeability is moderately slow, and available water capacity is high. Tilth is poor, and the soil can be worked only over a moderate range of moisture conditions. The root zone is deep and is easily penetrated by plant roots.

This soil has high potential for row crops, small grains, and irrigated pasture and hay. The moderately slow permeability of the soil limits farming unless irrigation water is well managed. Commercial fertilizer increases yields. Good tilth can be maintained by returning crop residue to the soil and by growing green manure crops in the cropping system. The hazard of wind erosion is severe if cultivated crops are grown, especially in spring, when strong winds are common. Minimum tillage, cover crops, stripcropping, and windbreaks reduce runoff and wind erosion.

This soil has high potential for adapted windbreak species. Trees such as Arizona cypress, Rocky Mountain juniper, green ash, Siberian elm, and Russian-olive and the shrubs squawbush, lilac, and American plum can be grown with little or no difficulty.

This soil has high potential for urban development. The moderately slow permeability limits septic tank filter fields but can be overcome by increasing the size of the absorption area or modifying the filter field. Central waste disposal systems also eliminate this problem. The moderate shrink-swell potential and low strength limit

dwellings, small building, and local roads and streets but can be overcome by good design and use of good fill material. To reduce wind erosion, a mulch should be maintained on all disturbed areas, such as lawns or rights-of-way for roads, until a plant cover is established. Noncorrodible materials should be used for underground utilities.

The potential for wildlife habitat is high. This soil produces pasture, hay, orchards, and row crops that provide food and some cover for a variety of wildlife, including scaled and Gambel quail and mourning and white-winged dove. Russian-olive, cottonwood, several shrub and forb species, and grasses planted along unlined irrigation ditches, fence rows, odd areas, marshy sites, and flood plains improve habitat. Protected strip plantings of grain and green forage also provide food and cover.

PpA—Prelo silt loam, frequent overflow, 0 to 1 percent slopes. This deep, well drained, nearly level soil is in areas at the lower end of intermittent streams and where large quantities of water have been diverted by dikes or roads. Slopes are smooth and concave. Individual areas are 25 to 100 acres. This soil is usually covered with a dense stand of alkali sacaton except in areas of heavy grazing or cultivation.

Typically, the surface layer is reddish brown highly stratified fine sandy loam, very fine sandy loam, clay loam, and silt loam 12 inches thick. The subsoil is reddish brown silty clay loam about 20 inches thick. The substratum is reddish brown silty clay loam to a depth of more than 60 inches. Gypsum segregations are common in the substratum.

Included with this soil in mapping are areas of other Prelo soils and Alamogordo soils. Also included are wind hummocks of very fine sandy loam or silt loam. The included soils make up about 20 percent of this mapping unit. Individual areas are smaller than 2 acres.

This soil is calcareous throughout. Permeability is moderately slow, and available water capacity is high. Tilth is fair, and the soil can be worked over a moderate range of moisture conditions. Water stands on the surface for a short period after heavy rains. The root zone is deep and is relatively easily penetrated by plant roots.

If protected from flooding, this soil has medium potential for row crops and small grains. The potential of this soil is also limited because it occurs on narrow, elongated areas. It has high potential for hay and pasture. Good tilth is easily maintained by returning crop residue to the soil. Runoff is slow and the erosion hazard is moderate. Minimum tillage and cover crops, including grasses and legumes, reduce runoff and erosion.

This soil has high potential for adapted windbreak species. Trees such as Arizona cypress, Rocky Mountain juniper, green ash, Siberian elm, and Russian-olive and the shrubs squawbush, lilac, and American plum can be grown with little or no difficulty.

This soil has low potential for most urban uses. During strong rains, water from surrounding areas concentrates on this soil, depositing and removing sediment. Flooding can be prevented to some extent by proper drainage measures. The moderately slow permeability limits septic tank absorption fields but can be overcome by increasing the size of the absorption area or modifying the filter field.

The potential for wildlife habitat is high. This soil produces pasture, hay, orchards, and row crops that provide food and some cover for a variety of wildlife, including scaled and Gambel quail and mourning and white-winged dove. Russian-olive, cottonwood, several shrub and forb species, and grasses planted along unlined irrigation ditches, fence rows, odd areas, marshy sites, and flood plains improve habitat. Protected strip plantings of grain or green forage also provide food and cover. The soil must be protected from flooding in order to establish field or row crops.

PvB—Prelo-Prelo Variant complex, 0 to 3 percent slopes. This complex consists of small areas of deep, well drained soils on lower parts of toe slopes of pediments. These soils are so intermingled that it was not feasible to separate them on the high detail map. Areas of this complex are irregular in shape and are 10 to 150 acres in size.

Prelo silt loam makes up about 55 percent of each mapped area. Typically, the surface layer is reddish brown silt loam about 9 inches thick. The subsoil is reddish brown silt loam about 15 inches thick. The substratum is reddish brown silty clay loam to a depth of more than 60 inches. The substratum contains accumulations of gypsum in the form of small crystals or soft masses. A desert pavement covers about 20 percent of the area of this soil.

This soil is strongly calcareous throughout. Gypsum content increases with depth. Permeability is moderately slow, and available water capacity is high. The root zone is deep and is easily penetrated by plant roots.

Prelo Variant silt loam makes up about 30 percent of each mapped area. Typically, the surface layer is reddish brown silt loam about 7 inches thick. The subsoil is reddish brown silt loam and silty clay loam about 15 inches thick. The upper 8 inches of the substratum is reddish brown silty clay loam and contains many fine filaments of gypsum. The lower part of the substratum is light reddish brown very gravelly sandy loam to a depth of more than 60 inches.

This soil is strongly calcareous. Gypsum is throughout the profile. Permeability is moderately slow above a depth of 30 inches and is moderately rapid below this depth. Available water capacity is medium.

Included in the mapping are small intermingled areas of Largo and Alamogordo soils and areas of eroded Prelo silt loam. Also included are small areas of Prelo sandy loam and McCullough soils. The inclusions make

up about 15 percent of each mapped area. Individual areas are generally smaller than 3 acres.

This complex has good potential for farming. The complex pattern of the soil causes problems in managing irrigation water. Sprinkler and drip irrigation systems are more efficient than surface systems. Good tilth can be maintained by growing green manure crops and returning crop residue to the soil. The hazards of wind erosion and water erosion are severe if cultivated crops are grown. Minimum tillage, cover crops, stripcropping, and windbreaks reduce runoff and water and wind erosion. Commercial fertilizer increases yields of all crops.

These soils have moderate potential for adapted windbreak species. Trees such as Arizona cypress, Rocky Mountain juniper, green ash, Siberian elm, and Russian-olive and the shrubs squawbush, lilac, and American plum can be grown with little or no difficulty, but because of the gravelly substratum of the Prelo Variant soil, more frequent irrigation is necessary. Other species can be grown but special treatment is required to overcome specific soil conditions.

This complex has good potential for urban development. The Prelo soils have moderately slow permeability, which limits septic tank absorption fields. Increasing the size of the absorption area or modifying the design of the filter field helps to overcome this problem. The Prelo Variant soil has no restrictions for septic tank absorption fields, but ground water may be contaminated, especially if population density becomes too high. Onsite investigation is necessary. Moderate shrink-swell potential and low strength of both soils limit dwellings and local roads and streets but can be overcome by good design, careful installation, and use of suitable fill material. Some areas need to be protected from runon water from surrounding areas.

The potential for wildlife habitat is moderate to high. This complex produces pasture, hay, orchards, and row crops that provide food and some cover for a variety of wildlife, including scaled and Gambel quail and mourning and white-winged dove. Russian-olive, cottonwood, several shrub and forb species, and grasses planted along unlined irrigation ditches, fence rows, odd areas, marshy sites, and flood plains improve habitat. Protected strip plantings of grain or green forage also provide food and cover.

RbA—Reeves very fine sandy loam, 0 to 1 percent slopes. This deep, well drained, nearly level soil is on eolian uplands and in depressional drainageways. Slopes are smooth and slightly concave. Individual areas are 10 to 40 acres in size.

Typically, the surface layer is pale brown very fine sandy loam about 8 inches thick. The subsoil is brown and pale brown silt loam about 12 inches thick. It is high in lime. The substratum to a depth of more than 60 inches is very pale brown sandy loam, light brown fine sandy loam, and pink silt loam and is high in lime and gypsum.

Included with this soil in mapping are intermingled areas of Holloman, Tome, and Prelo soils. The included soils make up about 15 percent of this unit. Some small areas receive extra water as runon.

This soil is calcareous in the surface layer and strongly calcareous in the subsoil. Gypsum content is high in the substratum. Permeability is moderate, and available water capacity is medium. Tilth is good, and the soil can be worked over a moderate range of moisture conditions. The root zone is moderately deep and is easily penetrated by plant roots, but the gypsum in the substratum restricts the roots of many plants.

This soil has medium potential for row crops and small grains under irrigation. Irrigation is necessary for farming. This soil has high potential for irrigated pasture and medium potential for hay. Good tilth is maintained by returning crop residue to the soil. The hazard of wind erosion is severe if annual crops are grown. Minimum tillage and returning crop residue to the soil reduce wind erosion.

This soil has low potential for adapted windbreak species. Trees such as Arizona cypress, Rocky Mountain juniper, green ash, Siberian elm, and Russian-olive and the shrubs squawbush, lilac, and American plum can be grown, but special treatment is required to overcome specific soil conditions.

This soil has medium to low potential for most urban uses. Low strength, moderate shrink-swell potential, and corrosivity are major limitations. Good design and proper installation can overcome the low strength and moderate shrink-swell potential, but the corrosivity is almost impossible to overcome except by using plastics. The gypsum content of the substratum adversely affects many uses. Since depth to gypsum ranges from 20 to 40 inches, onsite investigation is necessary for many uses.

The potential for wildlife habitat is moderate. This soil produces pasture, hay, orchards, and row crops that provide food and some cover for a variety of wildlife, including scaled and Gambel quail and mourning and white-winged dove. Russian-olive, cottonwood, several shrub and forb species, and grasses planted along unlined irrigation ditches, fence rows, odd areas, marshy sites, and flood plains improve habitat. Protected strip plantings of grain or green forage also provide food and cover.

RcB2—Reeves very fine sandy loam, 0 to 2 percent slopes, eroded. This deep, well drained, nearly level soil is on the lower part of alluvial toe slopes. Slopes are smooth and convex. A railroad, a highway, and diversions built in the area cause a concentration of water to move rapidly across this soil. Most areas are severely eroded. Many small channels, generally less than 2 feet deep, dissect the area, and a few deeper

gullies are in the unit. Individual areas of this soil are 10 to 50 acres in size.

Typically, the surface layer is pale brown very fine sandy loam about 2 inches thick. The subsoil is about 25 inches thick. The upper part of the subsoil is yellowish brown silt loam, and the lower part is light brown, calcareous silt loam. The substratum to a depth of more than 60 inches is pink silt loam that is high in gypsum.

Included with this soil in mapping are a few intermingled areas of Prelo, Alamogordo, and Tome soils. Also included are some very small areas of deep very gravelly soils adjacent to or in drainageways. A few small areas have as much as 15 percent wind hummocks. The proportion of wind hummocks over the entire unit is less than 5 percent. These wind hummocks are generally more than 2 feet high, and their texture varies. The included soils make up about 20 percent of this unit. Individual areas of these soils are generally smaller than 1 acre.

This soil is calcareous in the surface layer and strongly calcareous in the subsoil. Gypsum content is high in the substratum. It occurs as soft powder and small crystals. Permeability is moderate and available water capacity is medium. Tilth is good, and the soil can be worked over a moderate range of moisture conditions. The root zone is moderately deep and is easily penetrated by plant roots.

This soil has medium potential for row crops and small grains under irrigation. It has high potential for irrigated pasture and medium potential for hay. This soil needs protection from the water that moves across the areas. Tilth can be maintained by returning crop residue to the soil. The hazard of wind erosion is severe if cultivated crops are grown. Minimum tillage and leaving crop residue on the surface help to control wind erosion. The water erosion hazard is severe if the soils are not protected by diversions, dikes, and grassed waterways.

This soil has low potential for adapted windbreak species. Trees such as Arizona cypress, Rocky Mountain juniper, green ash, Siberian elm, and Russian-olive and the shrubs squawbush, lilac, and American plum can be grown, but special treatment is required to overcome specific soil conditions.

This soil has medium to low potential for most urban uses. Low strength, moderate shrink-swell potential, and corrosivity are major limitations. Good design and proper installation can overcome the low strength, but corrosivity is almost impossible to overcome except by using plastics. The gypsum content of the substratum adversely affects many uses. Since depth to gypsum ranges from 25 to 40 inches, onsite investigation is necessary for many uses.

The potential for wildlife habitat is moderate. This soil produces pasture, hay, orchards, and row crops that provide food and some cover for a variety of wildlife, including scaled and Gambel quail and mourning and white-winged dove. Russian-olive, cottonwood, several shrub and forb species, and grasses planted along unlined irrigation ditches, fence rows, odd areas, marshy sites, and flood plains improve habitat. Protected strip plantings of grain or green forage also provide food and cover.

RdA—Reeves very fine sandy loam, frequent overflow, 0 to 1 percent slopes. This deep, well drained, nearly level soil is on parts of toe slopes of alluvial pediments that normally are the lower end of drainageways that dissect the upper pediments east of these areas. Slopes are smooth and slightly concave. A railroad and highway obstruct normal flow of water, causing the water to be concentrated in these areas. Other dikes and diversions built to protect urban developments divert water onto this soil. Individual areas are 5 to 20 acres in size.

Typically, the surface layer is light yellowish brown very fine sandy loam about 10 inches thick. The subsoil is about 25 inches thick. The upper part of the subsoil is light brownish gray silt loam, and the lower part is light brown clay loam. Accumulations of gypsum are in the lower part of the subsoil. The substratum to a depth of more than 60 inches is pinkish white silt loam that is very high in gypsum as soft powder and small crystals.

Included with this soil in mapping are some areas of Tome and Prelo soils. In the western part of the survey area, areas of Holloman soils are also included. Small, narrow drainageways meander across the unit, and small beds of gravel have been deposited along them in several places. The included soils make up about 20 percent of the unit.

This soil is calcareous in the surface layer and strongly calcareous in the subsoil. Permeability is moderate, and available water capacity is medium. Tilth is good, and the soil can be worked over a moderate range of moisture conditions. The root zone is moderately deep and is easily penetrated by plant roots. Because of the position of this soil, the flow of water onto this soil needs to be altered to prevent possible flooding or erosion of the surface layer.

This soil has medium potential for row crops and small grains. Moderate to moderately high yields can be obtained under good management. Irrigation is necessary for row crops, small grains, pasture, or hay. This soil has high potential for irrigated pasture and adapted hay. Good tilth can be maintained by returning crop residue to the soil. The hazard of wind erosion is severe if the surface is left unprotected, and the water erosion hazard is severe if runon water is not diverted or controlled.

This soil has low potential for adapted windbreak species. Trees such as Arizona cypress, Rocky Mountain juniper, green ash, Siberian elm, and Russian-olive and the shrubs squawbush, lilac, and American plum can be grown, but special treatment is required to overcome specific soil conditions.

This soil has low potential for most urban uses. Low strength, moderate shrink-swell potential, and corrosivity

are limitations. Proper design and careful installation can overcome the low strength, but the corrosivity is very difficult to overcome. The gypsum in the lower part of the profile adversely affects many interpretations. Since the depth to gypsum is 25 to 40 inches, onsite investigation is necessary for many uses. Flooding is also a limitation for structures on this soil.

The potential for wildlife habitat is moderate to high. This soil produces pasture, hay, orchards, and row crops that provide food and some cover for a variety of wildlife, including scaled and Gambel quail and mourning and white-winged dove. Russian-olive, cottonwood, several shrub and forb species, and grasses planted along unlined irrigation ditches, fence rows, odd areas, marsh sites, and flood plains improve habitat. Protected strip plantings of grain or green forage also provide food and cover.

TbA—Tobler silt loam, 0 to 1 percent slopes. This deep, well drained, nearly level soil is on small coalescing alluvial fans. Slopes are smooth and slightly concave. Individual areas are 10 to 50 acres in size.

Typically, the soil is stratified reddish brown silt loam, very fine sandy loam, loam, fine sandy loam, loamy fine sand, and loamy sand to a depth of 50 inches. Below that to a depth of more than 60 inches is a buried reddish brown silty clay loam subsoil of an older soil.

Included with this soil in mapping are small intermingled areas of Tobler soils that have a very fine sandy loam or fine sandy loam surface layer. Also included are very small intermingled areas of Prelo soils. The included soils make up about 15 percent of the unit. Individual areas are generally smaller than 1 acre.

This soil is calcareous throughout. In most places small amounts of gypsum are throughout the soil. Permeability is moderate, and available water capacity is moderate. Tilth is fair, and the soil can be worked over a moderate range of moisture conditions. The root zone is deep and is easily penetrated by plant roots.

This soil has high potential for row crops and small grains if it is protected from flooding. Diversions, dikes, and grassed waterways reduce the flooding hazard. This soil also has high potential for hay and pasture. Tilth can be maintained or improved by returning crop residue to the soil. The hazard of wind erosion is severe if cultivated crops are grown. Minimum tillage, cover crops, returning crop residue to the soil, and windbreaks reduce runoff and wind erosion.

This soil has high potential for adapted windbreak species. Trees such as Arizona cypress, Rocky Mountain juniper, green ash, Siberian elm, and Russian-olive and the shrubs squawbush, lilac, and American plum can be grown with little or no difficulty.

This soil has moderate potential for most urban uses. Flooding is a major restriction but can be reduced by diversions, dikes, and grassed waterways. Low strength and compressibility are also limitations but can be overcome by use of good fill material for foundations and by good design and careful installation.

The potential for wildlife habitat is high. This soil produces pasture, hay, orchards, and row crops that provide food and some cover for a variety of wildlife, including scaled and Gambel quail and mourning and white-winged dove. Russian-olive, cottonwood, several shrub and forb species, and grasses planted along unlined irrigation ditches, fence rows, odd areas, marshy sites, and flood plains improve habitat. Protected plantings of grain or green forage also provide food and cover.

TcA—Tome very fine sandy loam, 0 to 1 percent slopes. This deep, well drained, nearly level soil is on elongated, fan-shaped lower parts of pediments at the lower end of large relic streams. This soil occasionally receives some runon water. There are a few small drainageways, but sheet-type runoff is common. Slopes are smooth and slightly concave. Individual areas are 30 to 200 acres in size.

Typically, the surface layer is pinkish gray and pale brown very fine sandy loam about 6 inches thick. Below that, the soil is pale brown, weakly stratified silt loam and very fine sandy loam to a depth of more than 60 inches.

Included with this soil in mapping are intermingled areas of Prelo, Emot, and McCullough soils. Small areas of overflow soils and a few narrow drainageways are also included. Inclusions make up less than 15 percent of this mapping unit.

This soil is calcareous throughout. In places it contains a few segregations of gypsum. Permeability is moderately slow, and available water capacity is high. Tilth is good, and the soil can be worked over a wide range of moisture conditions. The root zone is deep and is easily penetrated by plant roots.

The soil has medium potential for row crops and small grains, and moderate to moderately high yields can be obtained under good management. It has high potential for irrigated pasture and adapted hay. Good tilth is easily maintained by returning crop residue to the soil. The hazard of wind erosion is severe if annual crops are grown. Minimum tillage, leaving crop residue on the surface, and cover crops, including grasses and legumes, reduce runoff and wind erosion.

This soil has high potential for adapted windbreak species. Trees such as Arizona cypress, Rocky Mountain juniper, green ash, Siberian elm, and Russian-olive and the shrubs squawbush, lilac, and American plum can be grown with little or no difficulty.

This soil has high potential for most urban uses. Low strength is a moderate limitation but can be easily overcome by good design and careful installation. The moderately slow permeability limits septic tank absorption fields but can be overcome by increasing the size of the absorption area.

The potential for wildlife habitat is high. This soil produces pasture, hay, orchards, and row crops that provide

food and some cover for a variety of wildlife, including scaled and Gambel quail and mourning and white-winged dove. Russian-olive, cottonwood, several shrub and forb species, and grasses planted along unlined irrigation ditches, fence rows, odd areas, marshy sites, and flood plains improve habitat. Protected strip plantings of grain or green forage also provide food and cover.

TcB—Tome very fine sandy loam, 1 to 3 percent slopes, eroded. This deep, well drained, very gently sloping soil is on eroded fan-shaped lower parts of pediments. Large amounts of water pass over the unit, cutting rills and small gullies. Man-made diversions concentrate water in some areas, and fast-flowing streams pour onto the soil in other areas. Slopes are smooth and concave. Individual areas are 20 to 200 acres in size.

Typically, the surface layer is pale brown very fine sandy loam about 3 inches thick. The substratum is pale brown and brown, weakly stratified silt loam, silty clay loam, and very fine sandy loam to a depth of more than 60 inches.

Included with this soil in mapping are intermingled areas of Prelo, Emot, and Reeves soils. Also included are a few very small areas of Alamogordo soils. Wind hummocks are scattered sparsely over some mapped areas. Inclusions make up about 15 percent of the unit, but separate areas are generally smaller than 2 acres.

The soil is calcareous throughout. In places it contains a few segregations of gypsum. In some places gypsum is below a depth of 40 inches. Permeability is moderately slow, and available water capacity is high. Tilth is good, and the soil can be worked over a wide range of moisture conditions. The root zone is deep and is easily penetrated by plant roots.

This soil has medium potential for row crops and small grains, and moderate to moderately high yields can be obtained under good management. This soil needs protection from runon water. It has high potential for irrigated pasture and adapted hay. Good tilth is easily maintained by returning crop residue to the soil. The water erosion hazard is moderate and the wind erosion hazard is severe if cultivated crops are grown. Minimum tillage and cover crops, including grasses and legumes, reduce runoff and wind erosion.

This soil has high potential for adapted windbreak species. Trees such as Arizona cypress, Rocky Mountain juniper, green ash, Siberian elm, and Russian-olive and the shrubs squawbush, lilac, and American plum can be grown with little or no difficulty.

This soil has high potential for most urban uses if it is protected from runon water. Low strength and moderate shrink-swell potential are moderate limitations but can be easily overcome by good design and careful installation. The moderately slow permeability limits septic tank absorption fields but can be overcome by increasing the size of the absorption area. Flooding is a major limitation for urban uses, but it can be reduced by diversions and drains.

The potential for wildlife habitat is moderate. This soil produces pasture, hay, orchards, and row crops that provide food and some cover for a variety of wildlife, including scaled and Gambel quail and mourning and white-winged dove. Russian-olive, cottonwood, several shrub and forb species, and grasses planted along unlined irrigation ditches, fence rows, odd areas, marshy sites, and flood plains improve habitat. Protected strip plantings of grain or green forage also provide food and cover.

TeB—Tome silt loam, frequent overflow, 1 to 3 percent slopes. This deep, well drained, very gently sloping soil is on elongated, fan-shaped lower parts of pediments, generally at the lower end of large drainageways. Areas are dissected by many small meandering drainageways less than 6 inches deep. Slopes are smooth and slightly concave. Individual areas are 30 to 100 acres in size.

Typically, the surface layer is pinkish gray and pale brown silt loam about 6 inches thick. Below that, the soil is pale brown silt loam to a depth of more than 60 inches. In about 30 percent of the area, this soil has an overburden of very fine sandy loam or fine sandy loam about 6 inches thick.

Included with this soil in mapping are small intermingled areas of Emot and Prelo soils, generally contiguous to the small drainageways. The included soils make up about 15 percent of this mapping unit. Individual areas are generally smaller than 2 acres.

This soil is moderately alkaline. Permeability is moderately slow, and available water capacity is high. Tilth is good, and the soil can be worked over a reasonably wide range of moisture conditions. The root zone is deep and is easily penetrated by plant roots. Because of the position of this soil, the overflow needs to be diverted to prevent possible flooding and erosion of the surface layer.

This soil has medium potential for row crops and small grains, and moderate to moderately high yields can be obtained under good management. Irrigation is necessary for row crops, small grains, pasture, or hay. Good tilth can be maintained by returning crop residue to the soil. The wind erosion hazard is moderate to severe if this soil is cultivated. Minimum tillage, leaving crop residue on the surface, and cover crops, including grasses and legumes, reduce runoff and water and wind erosion.

This soil has high potential for adapted windbreak species. Trees such as Arizona cypress, Rocky Mountain juniper, green ash, Siberian elm, and Russian-olive and the shrubs squawbush, lilac, and American plum can be grown with little or no difficulty.

This soil has low potential for most urban uses because of its position on the landscape. Flooding can occur unless excess water is controlled by diversion.

Moderate shrink-swell potential is a moderate limitation but can be overcome by good design and careful installation. The moderately slow permeability limits septic tank absorption fields but can be overcome by increasing the size of the absorption area.

The potential for wildlife habitat is moderate. This soil produces pasture, hay, orchards, and row crops that provide food and some cover for a variety of wildlife, including scaled and Gambel quail and mourning and white-winged dove. Russian-olive, cottonwood, several shrub and forb species, and grasses planted along unlined irrigation ditches, fence rows, odd areas, marshy sites, and flood plains also provide food and cover.

TfB—Tome-Emot complex, 0 to 3 percent slopes. This complex consists of small to medium-sized areas of deep, well drained soils on foot slopes of pediments. These soils are so intermingled that it was not feasible to separate them on the high detail map. Areas are irregular and somewhat elongated and are 50 to 150 acres in size. Individual areas of each soil are smaller than 5 acres. Many small drainageways dissect this unit.

Tome loam makes up about 35 percent of each mapped area. Typically, the surface layer is pale brown loam about 5 inches thick. Below that, the soil is pale brown silt loam to a depth of more than 60 inches.

This soil is calcareous throughout. In most areas, it contains a few segregations of gypsum. Permeability is moderately slow, and available water capacity is high.

Emot gravelly fine sandy loam makes up about 35 percent of each mapped area. Typically, the surface layer is brown gravelly fine sandy loam about 4 inches thick. The next layer is brown gravelly very fine sandy loam about 7 inches thick. The substratum is brown extremely gravelly silt loam to a depth of more than 60 inches. A desert pavement covers about 30 percent of the surface.

This soil is strongly calcareous throughout. In some places the soil contains a few small, soft segregations of gypsum or small pendants or crystals of gypsum on the under side of pebbles. Permeability is moderately rapid, and available water capacity is moderate.

Included in mapping are small areas of soils that are similar to the Tome soil but that contain 10 to 30 percent gravel below a depth of 30 inches. These soils are generally on small, elongated ridges adjacent to the small draingeways but also occur throughout the unit. Also included are small areas of Tome and Largo silt loam intermixed with the Tome loam. Small areas of Nickel, Aztec, and Ogral soils are on ridges and the upper part of pediments. The included soils make up about 30 percent of the map unit.

These soils have moderate potential for farming. The pattern of the Emot soil throughout the unit makes management of irrigation water difficult. Sprinkler or drip irrigation systems are more efficient than surface systems. The gravelly surface layer can interfere with some tillage and seeding operations. The hazard of wind erosion is severe if annual crops are grown. Minimum tillage, cover crops, and windbreaks reduce runoff and prevent soil blowing. Returning crop residue to the soil maintains good tilth. Irrigated pasture and hay produce good yields under good management. Generally, nitrogen is needed for all crops except legumes, and legumes respond to phosphate. Water-holding structures should be built on the Tome soil. Onsite investigation is needed to locate suitable sites for these structures.

These soils have moderate potential for adapted windbreak species. Trees such as Arizona cypress, Rocky Mountain juniper, green ash, Siberian elm, and Russian-olive and the shrubs squawbush, lilac, and American plum can be grown with little or no difficulty; however, because they are gravelly the Emot soil requires more frequent irrigation. Other species can be grown, but special treatment is required to overcome specific soil conditions.

Development of small ranchette-type homesites has led to increased urban use of these soils. The moderately slow permeability of the Tome soil limits septic tank filter fields but can be overcome by increasing the size of the absorption area and modifying the filter field. The moderate shrink-swell potential of the Tome soil limits foundations for buildings and local roads and streets. Good design and use of good fill material help to overcome this limitation. Septic tank filter fields work well in the Emot soil, but contamination of underground water is possible, especially if the gravelly substratum is thick and there are shallow wells nearby. To reduce soil blowing, a mulch should be maintained until new lawns are well established.

The potential for wildlife habitat is moderate. These soils produce pasture, hay, orchards, and row crops that provide food and some cover for a variety of wildlife, including scaled and Gambel quail and mourning and white-winged dove. Russian-olive, cottonwood, several shrub and forb species, and grasses planted along unlined irrigation ditches, fence rows, odd areas, marshy sites, and flood plains improve habitat. Protected strip plantings of grain or green forage also provide food and cover.

TvA—Torrifluvents, hummocky, 0 to 1 percent slopes. This complex consists of small areas of variable alluvial soils on elongated terraces, benches, and alluvial fans adjacent to both intermittent and perennial streams. These soils are so intermingled that it was not feasible to separate them on the high detail map. Areas are 10 to 100 acres in size. Individual areas of each soil are 0.25 to 2 acres.

The soils are stratified layers of fine sand, coarse sand, loamy sand, sandy loam, fine sandy loam, loam, and silt loam. Gravel lenses are common in all of the soils, but in about 50 percent of the area the soils contain 35 to 80 percent gravel. Cobbles, stones, and some

boulders are common on the surface along the outer edges of alluvial fans. These soils make up about 70 percent of the complex. Hummocks of variable textured material make up about 15 percent of this unit. The hummocks average about 3 feet high but range from 1 to 4 feet in height.

Included in mapping are a few areas of Prelo, Largo, and Alamogordo soils. They are on benches along the drainageways. These soils make up 15 percent of the unit.

Most areas of this complex are used for wildlife habitat and, to a limited extent, livestock grazing. The potential for any use other than wildlife habitat is low or very low. The intermingled pattern of soils, gravel, and cobbles and the hazard of flooding limit use to wildlife habitat. A few small areas of 1 or 2 acres could be farmed if flood water were diverted. Because of the possibility of flooding any attempt at urbanization is hazardous. Diversions would be necessary, and these would cause the inundation of areas surrounding and downstream. Onsite investigation is necessary for any use.

These soils are so intermixed and variable that onsite investigation is necessary to determine what adapted windbreak species, if any, can be grown. Special site preparation is necessary in places.

UaA—Ustic Torriorthents, frequent overflow, 0 to 1 percent slopes. This complex is in narrow, elongated drainageways that carry large, slow flowing streams during intense rainstorms. The drainageways are 50 to 400 feet wide and are 10 to 30 feet deep. Areas of these soils are 20 to 100 acres in size.

These soils are extremely variable, and no one profile represents this map unit. A common one has a dark reddish brown silt loam surface layer about 12 inches thick. The next layer is dark reddish brown clay loam about 16 inches thick. The substratum to a depth of more than 60 inches is light yellowish brown very fine sandy loam that has some accumulation of gypsum.

These soils are calcareous throughout and are moderately alkaline. Permeability averages moderately slow, and available water capacity is high.

Included with these soils in mapping are areas of Prelo, Holloman, and Alamogordo soils. These soils are scattered throughout the areas and are not in any particular position. These inclusions make up about 35 percent of the unit.

The potential for any use other than wildlife habitat or livestock grazing is low, mainly because of the flooding hazard and the variability of the soils. During rains, water from areas to the east concentrate on these soils. Because the soils are nearly level, water moves slowly and may pond for 24 to 48 hours. Diverting water from most of these areas is very difficult because these areas are the primary drainageways in the basin and the relief differences between the bottom land and uplands in the area leave no place for the water to go.

These soils are so variable and intermixed that onsite investigation is necessary to determine what adapted windbreak species, if any, can be grown. Special site preparation is necessary in places.

Use and management of the soils

The soil survey is a detailed inventory and evaluation of the most basic resource of the survey area—the soil. It is useful in adjusting land use, including urbanization, to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in uses of the land.

While a soil survey is in progress, soil scientists, conservationists, engineers, and others keep extensive notes about the nature of the soils and about unique aspects of behavior of the soils. These notes include data on erosion, drought damage to specific crops, yield estimates, flooding, the functioning of septic tank disposal systems, and other factors affecting the productivity, potential, and limitations of the soils under various uses and management. In this way, field experience and measured data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section is useful in planning use and management of soils for crops and pasture; rangeland; sites for buildings, highways and other transportation systems, sanitary facilities, and parks and other recreation facilities; and wildlife habitat. From the data presented, the potential of each soil for specified land uses can be determined, soil limitations to these land uses can be identified, and costly failures in houses and other structures, caused by unfavorable soil properties, can be avoided. A site where soil properties are favorable can be selected, or practices that will overcome the soil limitations can be planned.

Planners and others using the soil survey can evaluate the impact of specific land uses on the overall productivity of the survey area or other broad planning area and on the environment. Productivity and the environment are closely related to the nature of the soil. Plans should maintain or create a land-use pattern in harmony with the natural soil.

Contractors can find information that is useful in locating sources of sand and gravel, roadfill, and topsoil. Other information indicates the presence of bedrock, wetness, or very firm soil horizons that cause difficulty in excavation.

Health officials, highway officials, engineers, and many other specialists also can find useful information in this soil survey. The safe disposal of wastes, for example, is closely related to properties of the soil. Pavements, sidewalks, campsites, playgrounds, lawns, and trees and shrubs are influenced by the nature of the soil.

Crops and pasture

The major management concerns in the use of the soils for crops and pasture are described in this section. In addition, the crops or pasture plants best suited to the soil, including some not commonly grown in the survey area, are discussed, and the estimated yields of the main crops and hay and pasture plants are presented for each soil.

This section provides information about the overall agricultural potential of the survey area and about the management practices that are needed. The information is useful to equipment dealers, land improvement contractors, fertilizer companies, processing companies, planners, conservationists, and others. For each kind of soil, information about management is presented in the section "Soil maps for detailed planning." Planners of management systems for individual fields or farms should also consider the detailed information given in the description of each soil.

Yields per acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. Crops are grown only in the area mapped at high detail, and yields are given only for the high detail map units. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. Absence of an estimated yield indicates that the crop is not suited to or not commonly grown on the soil or that a given crop is not commonly irrigated.

The estimated yields were based mainly on the experience and records of farmers, conservationists, and extension agents. Results of field trials and demonstrations and available yield data from nearby counties were also considered.

The yields were estimated assuming that the latest soil and crop management practices were used. Hay and pasture yields were estimated for the most productive varieties of grasses and legumes suited to the climate and the soil. A few farmers may be obtaining average yields higher than those shown in table 5.

The management needed to achieve the indicated yields of the various crops depends on the kind of soil and the crop. Such management provides drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate tillage practices, including time of tillage and seedbed preparation and tilling when soil moisture is favorable; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residues, barnyard manure, and green-manure crops; harvesting crops with the smallest possible loss; and timeliness of all fieldwork.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown; that good quality irrigation water is uniformly applied in proper amounts as needed; and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of the soils for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not included because the acreage of these crops is small. The local offices of the Soil Conservation Service and the Cooperative Extension Service can provide information about the management concerns and productivity of the soils for these crops.

Range

Noel Marsh, range conservationist, Soil Conservation Service, prepared this section.

Range occupies about 97 percent of the Otero Area. Grazing of domestic livestock is a major use of this range. The rangeland in the survey area is on parts of four land resource areas and subareas (*3*) (fig. 14), which are defined on the basis of climate, topography, and soils. These are Rocky Mountain (RM-2), Pecos Canadian Plains and Valleys (CP-4), and Southern Desertic Basins, Plains and Mountains (SD-2 and SD-3). The soils of the RM-2 and CP-4 resource areas are potentially high producers of forage for both livestock and wildlife. The SD-2 and SD-3 areas are less productive.

Ewe-lamb and wether sheep operations are well suited to the CP-4 area and predominate there. The rest of the range is operated mainly as cow-calf and yearling cattle enterprises. Except for the higher elevations of the RM-2 part, the survey area is climatically suited to grazing all year. Range improvement is achieved mainly by altering the season of use from year to year and by periodically resting the range during the growing season of the various plants.

In addition to the grazing of livestock, associated uses of the rangeland include watershed, wildlife habitat, recreation, military operations, and production of noncommercial wood products such as firewood and fence posts.

Where climate and topography are about the same, differences in the kind and amount of vegetation that rangeland can produce are related closely to the kind of soil. Effective management is based on the relationships among soils, vegetation, and water.

Table 6 shows, for each kind of soil in the low detail survey, the name of the range site, the total annual production of vegetation in favorable, normal, and unfavorable years; the characteristic vegetation; and the expected percentage of each species in the composition of the potential natural plant community. Soils not listed cannot support a natural plant community of predominately grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. The following are explanations of column headings in table 6.

A *range site* is a distinctive kind of rangeland that differs from other kinds of rangeland in its ability to produce a characteristic natural plant community. Soils that produce a similar kind, amount, and proportion of range plants are grouped into range sites. For those areas where the relationship between soils and vegetation has been established, range sites can be interpreted directly from the soil map. Properties that determine the capacity of the soil to supply moisture and plant nutrients have the greatest influence on the productivity of range plants. Soil reaction, salt content, and a seasonal high water table are also important.

Total production refers to the amount of vegetation that can be expected to grow annually on well managed rangeland that is supporting the potential natural plant community. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year the amount and distribution of precipitation and the temperatures are such that growing conditions are substantially better than average; in a normal year these conditions are about average for the area; in an unfavorable year, growing conditions are well below average, generally because of low available soil moisture.

Dry weight refers to the total air-dry vegetation produced per acre each year by the potential natural plant community. Vegetation that is highly palatable to livestock and vegetation that is unpalatable are included. Some of the vegetation can also be grazed extensively by wildlife.

Characteristic vegetation is grasses, grasslike plants, forbs, and shrubs that make up most of the potential natural plant community on each soil are listed by common name. Under *Composition*, the expected proportion of each species is presented as the percentage, in air-dry weight, of the total annual production of herbaceous and woody plants. The amount that can be used as forage depends on the kinds of grazing animals and on the grazing season. Generally all of the vegetation produced is not used.

Range management requires, in addition to knowledge of the kinds of soil and the potential natural plant community, an evaluation of the present condition of the range vegetation in relation to its potential. Range condition is determined by comparing the present plant community with the potential natural plant community on a particular range site. The more closely the existing community resembles the potential community, the better the range condition. The objective in range management is to control grazing so that the plants growing on a site are about the same in kind and amount as the potential natural plant community for that site. Such management generally results in the maximum production of vegetation, conservation of water, and control of erosion. Sometimes, however, a range condition somewhat below the potential meets grazing needs, provides wildlife habitat, and protects soil and water resources.

Throughout the survey area the greatest improvement of rangeland can be achieved by applying practices such as brush management, planned grazing systems, fencing, and livestock water facilities. Range seeding is feasible only in higher, cooler, more moist parts of the survey area. Grazing on Federal land and private land should be coordinated for mutual benefit. Irrigated cropland and pasture in the Tularosa Basin can also be grazed. Higher stocking rates, more efficient use of forage, and greater production of meat and fiber can be achieved by stocking combinations of different kinds of livestock and wildlife.

Windbreaks and environmental plantings

Sherman Finch, forester, Soil Conservation Service, prepared this section.

Windbreaks are established to protect livestock, buildings, and yards from wind and snow. Windbreaks also help protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broad-leaved and coniferous species provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field, the interval depending on erodibility of the soil. They protect cropland and crops from wind, hold snow on the fields, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. A healthy planting stock of suitable species planted properly on a well prepared site and maintained in good condition can insure a high degree of plant survival.

Supplemental water is essential for establishment of windbreaks and environmental plantings in this area. For most species irrigation should be continued throughout the life of the planting. Weed control and elimination of competing vegetation is necessary when establishing new plantings. Continued cultivation is necessary for some plantings and depends to a large degree on what type of irrigation system is used. Additional information on the planning of windbreaks and screens and the planting and care of trees can be obtained from the local

office of the Soil Conservation Service, Extension Service, or New Mexico Department of State Forestry or from local nurserymen.

Engineering

This section provides information about the use of soils for building sites, sanitary facilities, construction material, and water management. Among those who can benefit from this information are engineers, landowners, community planners, town and city managers, land developers, builders, contractors, and farmers and ranchers.

The ratings in the engineering tables are based on test data and estimated data in the "Soil properties" section. The ratings were determined jointly by soil scientists and engineers of the Soil Conservation Service using known relationships between the soil properties and the behavior of soils in various engineering uses.

Among the soil properties and site conditions identified by a soil survey and used in determining the ratings in this section were grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock that is within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure or aggregation, in-place soil density, and geologic origin of the soil material. Where pertinent, data about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of absorbed cations were also considered.

On the basis of information assembled about soil properties, ranges of values can be estimated for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, shear strength, compressibility, slope stability, and other factors of expected soil behavior in engineering uses. As appropriate, these values can be applied to each major horizon of each soil or to the entire profile.

These factors of soil behavior affect construction and maintenance of roads, airport runways, pipelines, foundations for small buildings, ponds and small dams, irrigation projects, drainage systems, sewage and refuse disposal systems, and other engineering works. The ranges of values can be used to (1) select potential residential, commercial, industrial, and recreational uses; (2) make preliminary estimates pertinent to construction in a particular area; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for location of sanitary landfills, onsite sewage disposal systems, and other waste disposal facilities; (5) plan detailed onsite investigations of soils and geology; (6) find sources of gravel, sand, clay, and topsoil; (7) plan farm drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; (8) relate performance of structures already built to the properties of the kinds of soil on which they are built so that performance of similar structures on the same or a similar soil in other locations can be predicted; and (9) predict the trafficability of soils for cross-country movement of vehicles and construction equipment.

Data presented in this section are useful for land-use planning and for choosing alternative practices or general designs that will overcome unfavorable soil properties and minimize soil-related failures. Limitations to the use of these data, however, should be well understood. First, the data are generally not presented for soil material below a depth of 5 or 6 feet. Also, because of the scale of the detailed map in this soil survey, small areas of soils that differ from the dominant soil may be included in mapping. Thus, these data do not eliminate the need for onsite investigations, testing, and analysis by personnel having expertise in the specific use contemplated.

The information is presented mainly in tables. The tables show, for each kind of soil in both low detail and high detail map units, the degree and kind of limitations for building site development, for sanitary facilities, and for water management and the suitability of each kind of soil as a source of construction materials.

The information in the tables, along with the soil map, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations and to construct interpretive maps for specific uses of land.

Some of the terms used in this soil survey have a special meaning in soil science. Many of these terms are defined in the Glossary.

Building site development

The degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, and local roads and streets are indicated in table 7 for low detail map units and in table 8 for high detail map units. A *slight* limitation indicates that soil properties generally are favorable for the specified use; any limitation is minor and easily overcome. A *moderate* limitation indicates that soil properties and site features are unfavorable for the specified use, but the limitations can be overcome or minimized by special planning and design. A *severe* limitation indicates that one or more soil properties or site features are so unfavorable or difficult to overcome that a major increase in construction effort, special design, or intensive maintenance is required. For some soils rated severe, such costly measures may not be feasible.

Shallow excavations are made for pipelines, sewerlines, communications and power transmission lines, basements, open ditches, and cemeteries. Such digging or trenching is influenced by soil wetness caused by a seasonal high water table; the texture and consistence of soils; the tendency of soils to cave in or slough; and the presence of very firm, dense soil layers, bedrock, or large stones. In addition, excavations are affected by

slope of the soil and the probability of flooding. Ratings do not apply to soil horizons below a depth of 6 feet unless otherwise noted.

In the soil series descriptions, the consistence of each soil horizon is given, and the presence of very firm or extremely firm horizons, usually difficult to excavate, is indicated.

Dwellings and *small commercial buildings* are built on undisturbed soil and have foundation loads of a dwelling no more than three stories high. Separate ratings are made for small commercial buildings without basements and for dwellings with and without basements. For such structures, soils should be sufficiently stable that cracking or subsidence of the structure from settling or shear failure of the foundation does not occur. These ratings were determined from estimates of the shear strength, compressibility, and shrink-swell potential of the soil. Soil texture, plasticity and in-place density, potential frost action, soil wetness, and depth to a seasonal high water table were also considered. Soil wetness and depth to a seasonal high water table indicate potential difficulty in providing adequate drainage for basements, lawns, and gardens. Depth to bedrock, slope, and large stones in or on the soil are also important considerations in the choice of sites for these structures and were considered in determining the ratings. Susceptibility to flooding is a serious hazard.

Local roads and streets have an all-weather surface that can carry light to medium traffic all year. They consist of a subgrade of the underlying soil material; a base of gravel, crushed rock fragments, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. The roads are graded with soil material at hand, and most cuts and fills are less than 6 feet deep.

The load supporting capacity and the stability of the soil as well as the quantity and workability of fill material available are important in design and construction of roads and streets. The classifications of the soil and the soil texture, density, shrink-swell potential, and potential frost action are indicators of the traffic supporting capacity used in making the ratings. Soil wetness, flooding, slope, depth to hard rock or very compact layers, and content of large stones affect stability and ease of excavation.

Sanitary facilities

Favorable soil properties and site features are needed for proper functioning of septic tank absorption fields, sewage lagoons, and sanitary landfills. The nature of the soil is important in selecting sites for these facilities and in identifying limiting soil properties and site features to be considered in design and installation. Also, those soil properties that affect ease of excavation or installation of these facilities will be of interest to contractors and local officials. The degree and kind of limitations of each soil for such uses and for use of the soil as daily cover for landfills are shown in table 9 for low detail map units and in table 10 for high detail map units. It is important to observe local ordinances and regulations.

If the degree of soil limitation is expressed as *slight*, soils are generally favorable for the specified use and limitations are minor and easily overcome; if *moderate*, soil properties or site features are unfavorable for the specified use, but limitations can be overcome by special planning and design; and if *severe*, soil properties or site features are so unfavorable or difficult to overcome that major soil reclamation, special designs, or intensive maintenance is required. Soil suitability is rated by the terms *good*, *fair*, or *poor*, which, respectively, mean about the same as the terms *slight*, *moderate*, and *severe*.

Septic tank absorption fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into the natural soil. Only the soil horizons between depths of 18 and 72 inches are evaluated for this use. The soil properties and site features considered are those that affect the absorption of the effluent and those that affect the construction of the system.

Properties and features that affect absorption of the effluent are permeability, depth to seasonal high water table, depth to bedrock, and susceptibility to flooding. Stones, boulders, and shallowness to bedrock interfere with installation. Excessive slope can cause lateral seepage and surfacing of the effluent. Also, soil erosion and soil slippage are hazards if absorption fields are installed on sloping soils.

In some soils, loose sand and gravel or fractured bedrock is less than 4 feet below the tile lines. In these soils the absorption field does not adequately filter the effluent, and ground water in the area may be contaminated.

On many of the soils that have moderate or severe limitations for use as septic tank absorption fields, a system to lower the seasonal water table can be installed or the size of the absorption field can be increased so that performance is satisfactory.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons have a nearly level floor and cut slopes or embankments of compacted soil material. Aerobic lagoons generally are designed to hold sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Soils that are very high in content of organic matter and those that have cobbles, stones, or boulders are not suitable. Unless the soil has very slow permeability, contamination of ground water is a hazard where the seasonal high water table is above the level of the lagoon floor. In soils where the water table is seasonally high, seepage of ground water into the lagoon can seriously reduce the lagoon's capacity for liquid waste. Slope, depth to bedrock, and susceptibility to flooding also

affect the suitability of sites for sewage lagoons or the cost of construction. Shear strength and permeability of compacted soil material affect the performance of embankments.

Sanitary landfill is a method of disposing of solid waste by placing refuse in successive layers either in excavated trenches or on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil material. Landfill areas are subject to heavy vehicular traffic. Risk of polluting ground water and trafficability affect the suitability of a soil for this use. The best soils have a loamy or silty texture, have moderate to slow permeability, are deep to a seasonal water table, and are not subject to flooding. Clayey soils are likely to be sticky and difficult to spread. Sandy or gravelly soils generally have rapid permeability, which might allow noxious liquids to contaminate ground water. Permeability is not a limitation in arid areas that receive an average of less than 10 inches of rain per year. Soil wetness can be a limitation, because operating heavy equipment on a wet soil is difficult. Seepage into the refuse increases the risk of pollution of ground water.

Ease of excavation affects the suitability of a soil for the trench type of landfill. A suitable soil is deep to bedrock and free of large stones and boulders. If the seasonal water table is high, water will seep into trenches.

Unless otherwise stated, the limitations apply only to the soil material within a depth of about 6 feet. If the trench is deeper, a limitation of slight or moderate may not be valid. Site investigation is needed before a site is selected.

Daily cover for landfill should be soil that is easy to excavate and spread over the compacted fill in wet and dry periods. Soils that are loamy or silty and free of stones or boulders are better than other soils. Clayey soils may be sticky and difficult to spread; sandy soils may be subject to soil blowing.

The soils selected for final cover of landfills should be suitable for growing plants. Of all the horizons, the A horizon in most soils has the best workability, more organic matter, and the best potential for growing plants. Thus, for either the area- or trench-type landfill, stockpiling material from the A horizon for use as the surface layer of the final cover is desirable.

Where it is necessary to bring in soil material for daily or final cover, thickness of suitable soil material available and depth to a seasonal high water table in soils surrounding the sites should be evaluated. Other factors to be evaluated are those that affect reclamation of the borrow areas. These factors include slope, erodibility, and potential for plant growth.

Construction materials

The suitability of each soil as a source of roadfill, sand, gravel, and topsoil is indicated in tables 11 and 12 by ratings of good, fair, or poor. The soils in low detail map units are rated in table 11 and the soils in high detail map units are rated in table 12. The texture, thickness, and organic-matter content of each soil horizon are important factors in rating soils for use as construction materials. Each soil is evaluated to the depth observed, generally about 6 feet.

Roadfill is soil material used in embankments for roads. Soils are evaluated as a source of roadfill for low embankments, which generally are less than 6 feet high and less exacting in design than high embankments. The ratings reflect the ease of excavating and working the material and the expected performance of the material where it has been compacted and adequately drained. The performance of soil after it is stabilized with lime or cement is not considered in the ratings, but information about some of the soil properties that influence such performance is given in the descriptions of the soil series.

The ratings apply to the soil material between the A horizon and a depth of 5 to 6 feet. It is assumed that soil horizons will be mixed during excavation and spreading. Many soils have horizons of contrasting suitability within their profile. The estimated engineering properties in tables 19 and 20 provide specific information about the nature of each horizon. This information can help determine the suitability of each horizon for roadfill.

Soils rated *good* are coarse grained. They have low shrink-swell potential, low potential frost action, and few cobbles and stones. They are at least moderately well drained and have slopes of 15 percent or less. Soils rated *fair* have a plasticity index of less than 15 and have other limiting features, such as moderate shrink-swell potential, moderately steep slopes, wetness, or many stones. If the thickness of suitable material is less than 3 feet, the entire soil is rated *poor*.

Sand and *gravel* are used in great quantities in many kinds of construction. The ratings provide guidance as to where to look for probable sources and are based on the probability that soils in a given area contain sizable quantities of sand or gravel. A soil rated *good* or *fair* has a layer of suitable material at least 3 feet thick, the top of which is within a depth of 6 feet. Coarse fragments of soft bedrock material, such as shale and siltstone, are not considered to be sand and gravel. Fine-grained soils are not suitable sources of sand and gravel.

The ratings do not take into account depth to the water table or other factors that affect excavation of the material. Descriptions of grain size, kinds of minerals, reaction, and stratification are given in the soil series descriptions and in tables 19 and 20.

Topsoil is used in areas where vegetation is to be established and maintained. Suitability is affected mainly by the ease of working and spreading the soil material in preparing a seedbed and by the ability of the soil material to support plantlife. Also considered is the damage

that can result at the area from which the topsoil is taken.

The ease of excavation is influenced by the thickness of suitable material, wetness, slope, and amount of stones. The ability of the soil to support plantlife is determined by texture, structure, and the amount of soluble salts or toxic substances. Organic matter in the A1 or Ap horizon greatly increases the absorption and retention of moisture and nutrients. Therefore, the soil material from these horizons should be carefully preserved for later use.

Soils rated *good* have at least 16 inches of friable loamy material at their surface. They are free of stones and cobbles, are low in content of gravel, and have gentle slopes. They are low in soluble salts that can limit or prevent plant growth. They are naturally fertile or respond well to fertilizer. They are not so wet that excavation is difficult during most of the year.

Soils rated *fair* are loose sandy soils or firm loamy or clayey soils in which the suitable material is only 8 to 16 inches thick or soils that have appreciable amounts of gravel, stones, or soluble salt.

Soils rated *poor* are very sandy soils and very firm clayey soils; soils with suitable layers less than 8 inches thick; soils having large amounts of gravel, stones, or soluble salt; steep soils; and poorly drained soils.

Although a rating of *good* is not based entirely on high content of organic matter, a surface horizon is generally preferred for topsoil because of its organic-matter content. This horizon is designated as A1 or Ap in the soil series descriptions. The absorption and retention of moisture and nutrients for plant growth are greatly increased by organic matter.

Water management

Many soil properties and site features that affect water management practices have been identified in this soil survey. The soil and site features that affect use are indicated in table 13 for the low detail map units and in table 14 for the high detail map units. This information is significant in planning, installing, and maintaining water control structures.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have a low seepage potential, which is determined by permeability and the depth to fractured or permeable bedrock or other permeable material.

Embankments, dikes, and levees require soil material that is resistant to seepage, erosion, and piping and has favorable stability, shrink-swell potential, shear strength, and compaction characteristics. Large stones and organic matter in a soil downgrade the suitability of a soil for use in embankments, dikes, and levees.

Drainage of soil is affected by such soil properties as permeability; texture; depth to bedrock, hardpan, or other layers that affect the rate of water movement; depth to the water table; slope; stability of ditchbanks; susceptibility to flooding; salinity and alkalinity; and availability of outlets for drainage.

Irrigation is affected by such features as slope, susceptibility to flooding, hazards of water erosion and soil blowing, texture, presence of salts and alkali, depth of root zone, rate of water intake at the surface, permeability of the soil below the surface layer, available water capacity, need for drainage, and depth to the water table.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to intercept runoff. They allow water to soak into the soil or flow slowly to an outlet. Features that affect suitability of a soil for terraces are uniformity and steepness of slope; depth to bedrock, hardpan, or other unfavorable material; large stones; permeability; ease of establishing vegetation; and resistance to water erosion, soil blowing, soil slipping, and piping.

Recreation

The soils of the survey area are rated in tables 15 and 16 according to limitations that affect their suitability for recreation uses. The soils in low detail map units are rated in table 15, and the soils in high detail map units are rated in table 16. The ratings are based on such restrictive soil features as flooding, wetness, slope, and texture of the surface layer. Not considered in these ratings, but important in evaluating a site, are location and accessibility of the area, size and shape of the area and its scenic quality, the ability of the soil to support vegetation, access to water, potential water impoundment sites available, and either access to public sewerlines or capacity of the soil to absorb septic tank effluent. Soils subject to flooding are limited, in varying degree, for recreation use by the duration and intensity of flooding and the season when flooding occurs. Onsite assessment of height, duration, intensity, and frequency of flooding is essential in planning recreation facilities.

The degree of the limitation of the soils is expressed as slight, moderate, or severe. *Slight* means that the soil properties are generally favorable and that the limitations are minor and easily overcome. *Moderate* means that the limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in tables can be supplemented by information in other parts of this survey. Especially helpful are interpretations for septic tank absorption fields, given in tables 9 and 10, and interpretations for dwellings without basements and for local roads and streets, given in tables 7 and 8.

Camp areas require such site preparation as shaping and leveling for tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils for this use have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing camping sites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for use as picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that will increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones or boulders, is firm after rains, and is not dusty when dry. If shaping is required to obtain a uniform grade, the depth of the soil over bedrock or hardpan should be enough to allow necessary grading.

Paths and trails for walking, horseback riding, bicycling, and other uses should require little or no cutting and filling. The best soils for this use are those that are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once during the annual period of use. They should have moderate slopes and have few or no stones or boulders on the surface.

Wildlife habitat

William J. Slone, biologist, Soil Conservation Service, prepared this section.

Soils directly affect the kind and amount of vegetation that is available to wildlife as food and cover, and they affect the construction of water impoundments. The kind and abundance of wildlife that populate an area depend largely on the amount and distribution of food, cover, and water. If any one of these elements is missing, is inadequate, or is inaccessible, wildlife either are scarce or do not inhabit the area.

The relationships between soils are more significant for wildlife habitat than the influence of individual soils, especially on uplands dissected by many drainageways. These areas support forbs and woody plants and provide water at certain times of the year. Shrubs and shrublike plants increase the value of the Nickel-Tencee general soil map unit for wildlife habitat. (See the section "General soil maps for broad land use planning.") Rotation grazing, brush management, wildlife watering facilities, and other practices designed for wildlife habitat management enhance the value of the soils to wildlife.

The Otero Area supports a diverse community of wildlife. Small mammals include cottontail and jackrabbit, several kinds of mice and rats, and predators. Pronghorn antelope and mule deer live in most of the Area. Desert bighorn occur mainly on the Alamogordo-Gypsum land-Aztec, Deama-Tortuga-Rock outcrop, Ector-Rock outcrop, Lozier-Rock outcrop, Tome-Mimbres, Nickel-Tencee, and Bluepoint-Onite-Wink general soil map units. Mountain lion, black bear, white-tailed deer, and elk are found on the Deama-Tortugas-Rock and Pena-Cale-Kerrick general soil map units.

Many permanent and migratory small birds and raptors live in the Area. The bird population is high during migration. Many of the large raptors, including the golden eagle, winter in the Area, attracted by the rodents. Several species of reptiles live here, mainly lizards and rattlesnakes and other snakes. Amphibians include salamanders and desert toads. The complex invertebrate community consists mostly of insects and arachnids.

Streams, ponds, and seeps, which are relatively rare in this dry area, provide habitat for invertebrates as well as water for the other animals. The White Sand pupfish is found only in some saline springs in the Tularosa Basin.

The population density of most animals is low throughout much of the area except in certain seasons, when population density and diversity of species become moderate to high. In the Deama-Tortugas-Rock outcrop, Ector-Rock outcrop, and Pena-Cale-Kerrick general soil map units, population density is moderately low to moderate for most animals. In these areas, the population density and diversity of birds is moderate to high during migration.

If the soils have the potential, wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by helping the natural establishment of desirable plants.

In tables 17 and 18, the soils in the survey area are rated according to their potential to support the main kinds of wildlife habitat in the area. This information can be used in planning for parks, wildlife refuges, nature study areas, and other developments for wildlife; selecting areas that are suitable for wildlife; selecting soils that are suitable for creating, improving, or maintaining specific elements of wildlife habitat; and determining the intensity of management needed for each element of the habitat. The soils in low detail map units are rated in table 17, and the soils in high detail map units are rated in table 18.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* means that the element of wildlife habitat or the kind of habitat is easily created, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected if the soil is used for the designated purpose. A rating of *fair* means that the element of wildlife habitat or kind of

habitat can be created, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* means that limitations are severe for the designated element or kind of wildlife habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* means that restrictions for the element of wildlife habitat or kind of wildlife are very severe, and that unsatisfactory results can be expected. Wildlife habitat is impractical or even impossible to create, improve, or maintain on soils having such a rating.

The elements of wildlife habitat are briefly described in the following paragraphs.

Grain and seed crops are seed-producing annuals used by wildlife. The major soil properties that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes that are planted for wildlife food and cover. Major soil properties that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, lovegrass, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds, that provide food and cover for wildlife. Major soil properties that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, wheatgrass, and grama.

Coniferous plants are cone-bearing trees, shrubs, or ground cover plants that furnish habitat or supply food in the form of browse, seeds, or fruitlike cones. Soil properties that have a major effect on the growth of coniferous plants are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Shrubs are bushy woody plants that produce fruit, buds, twigs, bark, or foliage used by wildlife or that provide cover and shade for some species of wildlife. Major soil properties that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and moisture. Examples of shrubs are mountain-mahogany, bitterbrush, snowberry, and big sagebrush.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites, exclusive of submerged or floating aquatics. They produce food or cover for wildlife that use wetland as habitat. Major soil properties affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, saltgrass, and cordgrass and rushes, sedges, and reeds.

Shallow water areas are bodies of water that have an average depth of less than 5 feet and that are useful to wildlife. They can be naturally wet areas, or they can be created by dams or levees or by water-control structures in marshes or streams. Major soil properties affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. The availability of a dependable water supply is important if water areas are to be developed. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The kinds of wildlife habitat are briefly described in the following paragraphs.

Openland habitat consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The kinds of wildlife attracted to these areas include scaled and Gambel quail, mourning and white-winged dove, roadrunner, cottontail rabbit, jackrabbit, and coyote.

Woodland habitat consists of areas of hardwoods or conifers, or a mixture of both, and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include mountain lion, jackrabbit, pinyon, Steller's and scrub jays, golden eagle and southern bald eagle, mule deer and white-tailed deer, and black bear.

Wetland habitat consists of open, marshy or swampy, shallow water areas where water-tolerant plants grow. Some of the wildlife attracted to such areas are Mexican ducks and shore birds.

Rangeland habitat consists of areas of wild herbaceous plants and shrubs. Wildlife attracted to rangeland include pronghorn antelope, white-tailed deer, mule deer, Gambel quail, mourning dove, bald and golden eagle, cottontail rabbit, coyote, and mountain lion.

Soil properties

Extensive data about soil properties are summarized on the following pages. The two main sources of these data are the many thousands of soil borings made during the course of the survey and the laboratory analyses of selected soil samples from typical profiles.

In making soil borings during field mapping, soil scientists can identify several important soil properties. They note the seasonal soil moisture condition or the presence of free water and its depth. For each horizon in the profile, they note the thickness and color of the soil material; the texture, or amount of clay, silt, sand, and gravel or other coarse fragments; the structure, or the

natural pattern of cracks and pores in the undisturbed soil; and the consistence of the soil material in place under the existing soil moisture conditions. They record the depth of plant roots, determine the pH or reaction of the soil, and identify any free carbonates.

Samples of soil material are analyzed in the laboratory to verify the field estimates of soil properties and to determine all major properties of key soils, especially properties that cannot be estimated accurately by field observation. Laboratory analyses are not conducted for all soil series in the survey area, but laboratory data for many soil series not tested are available from nearby survey areas.

The available field and laboratory data are summarized in tables. The tables give the estimated range of engineering properties, the engineering classifications, and the physical and chemical properties of each major horizon of each soil in the survey area. They also present data about pertinent soil and water features and engineering test data.

Engineering properties

Tables 19 and 20 give estimates of engineering properties and classifications for the major horizons of each soil in the survey area. Table 19 gives estimates for soils on the low detail map, and table 20 gives estimates for soils on the high detail map.

Most soils have, within the upper 5 or 6 feet, horizons of contrasting properties. The tables give information for each of these contrasting horizons in a typical profile of each soil. *Depth* to the upper and lower boundaries of each horizon is indicated. More information about the range in depth and about other properties in each horizon is given for each soil series in the section "Soil series and morphology."

Texture is described in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in soil material that is less than 2 millimeters in diameter. "Loam," for example, is soil material that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains gravel or other particles coarser than sand, an appropriate modifier is added, for example, "gravelly loam." Other texture terms are defined in the Glossary.

The two systems commonly used in classifying soils for engineering use (*7*) are the Unified Soil Classification System (Unified) (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO) (*1*).

The *Unified* system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter, plasticity index, liquid limit, and organic-matter content. Soils are grouped into 15 classes—eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes have a dual classification symbol, for example, CL-ML.

The *AASHTO* system classifies soils according to those properties that affect their use in highway construction and maintenance. In this system a mineral soil is classified in one of seven basic groups ranging from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines. At the other extreme, in group A-7, are fine-grained soils. Highly organic soils are classified in group A-8 on the basis of visual inspection.

When laboratory data are available, the A-1, A-2, and A-7 groups are further classified as follows: A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, and A-7-6. As an additional refinement, the desirability of soils as subgrade material can be indicated by a group index number. These numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The AASHTO classification for soils tested in the survey area, with group index numbers in parentheses, is given in table 25. The estimated classification, without group index numbers, is given in tables 19 and 20.

Also in tables 19 and 20 the percentage, by weight, of rock fragments more than 3 inches in diameter is estimated for each major horizon. These estimates are determined mainly by observing volume percentage in the field and then converting that, by formula, to weight percentage.

Percentage of the soil material less than 3 inches in diameter that passes each of four sieves (U.S. standard) is estimated for each major horizon. The estimates are based on tests of soils that were sampled in the survey area and in nearby areas and on field estimates from many borings made during the survey.

Liquid limit and *plasticity index* indicate the effect of water on the strength and consistence of soil. These indexes are used in both the Unified and AASHTO soil classification systems. They are also used as indicators in making general predictions of soil behavior. Range in liquid limit and plasticity index are estimated on the basis of test data from the survey area or from nearby areas and on observations of the many soil borings made during the survey.

In some surveys, the estimates are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount across classification boundaries (1 or 2 percent), the classification in the marginal zone is omitted.

Physical and chemical properties

Tables 21 and 22 show estimated values for several soil characteristics and features that affect behavior of soils in engineering uses. These estimates are given for each major horizon, at the depths indicated, in the typical pedon of each soil. The estimates are based on field observations and on test data for these and similar soils. Table 21 gives estimates for soils on the low detail map, and table 22 gives estimates for soils for the high detail map.

Permeability is estimated on the basis of known relationships among the soil characteristics observed in the field—particularly soil structure, porosity, and gradation or texture—that influence the downward movement of water in the soil. The estimates are for vertical water movement when the soil is saturated. Not considered in the estimates is lateral seepage or such transient soil features as plowpans and surface crusts. Permeability of the soil is an important factor to be considered in planning and designing drainage systems, in evaluating the potential of soils for septic tank systems and other waste disposal systems, and in many other aspects of land use and management.

Available water capacity is rated on the basis of soil characteristics that influence the ability of the soil to hold water and make it available to plants. Important characteristics are content of organic matter, soil texture, and soil structure. Shallow-rooted plants are not likely to use the available water from the deeper soil horizons. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design of irrigation systems.

Soil reaction is expressed as a range in pH values. The range in pH of each major horizon is based on many field checks. For many soils, the values have been verified by laboratory analyses. Soil reaction is important in selecting the crops, ornamental plants, or other plants to be grown; in evaluating soil amendments for fertility and stabilization; and in evaluating the corrosivity of soils.

Salinity is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of the nonirrigated soils. The salinity of individual irrigated fields is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of individual fields can differ greatly from the value given in the tables. Salinity affects the suitability of a soil for crop production, its stability when used as a construction material, and its potential to corrode metal and concrete.

Shrink-swell potential depends mainly on the amount and kind of clay in the soil. Laboratory measurements of the swelling of undisturbed clods were made for many soils. For others the swelling was estimated on the basis of the kind and amount of clay in the soil and on measurements of similar soils. The size of the load and the magnitude of the change in soil moisture content also influence the swelling of soils. Shrinking and swelling of some soils can cause damage to building foundations, basement walls, roads, and other structures unless special designs are used. A high shrink-swell potential indicates that special design and added expense may be required if the planned use of the soil will not tolerate large volume changes.

Erosion factors are used to predict the erodibility of a soil and its tolerance to erosion in relation to specific kinds of land use and treatment. The soil erodibility factor (K) is a measure of the susceptibility of the soil to erosion by water. Soils having the highest K values are the most erodible. K values range from 0.10 to 0.64. To estimate annual soil loss per acre, the K value of a soil is modified by factors representing plant cover, grade and length of slope, management practices, and climate. The soil-loss tolerance factor (T) is the maximum rate of soil erosion, whether from rainfall or soil blowing, that can occur without reducing crop production or environmental quality. The rate is expressed in tons of soil loss per acre per year.

Wind erodibility groups are made up of soils that have similar properties that affect their resistance to soil blowing if cultivated. The groups are used to predict the susceptibility of soil to blowing and the amount of soil lost as a result of blowing. Soils are grouped according to the following distinctions:

1. Sands, coarse sands, fine sands, and very fine sands. These soils are extremely erodible, so vegetation is difficult to establish. They are generally not suitable for crops.

2. Loamy sands, loamy fine sands, and loamy very fine sands. These soils are very highly erodible, but crops can be grown if intensive measures to control soil blowing are used.

3. Sandy loams, coarse sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible, but crops can be grown if intensive measures to control soil blowing are used.

4L. Calcareous loamy soils that are less than 35 percent clay and more than 5 percent finely divided calcium carbonate. These soils are erodible, but crops can be grown if intensive measures to control soil blowing are used.

4. Clays, silty clays, clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible, but crops can be grown if measures to control soil blowing are used.

5. Loamy soils that are less than 18 percent clay and less than 5 percent finely divided calcium carbonate and sandy clay loams and sandy clays that are less than 5 percent finely divided calcium carbonate. These soils are slightly erodible, but crops can be grown if measures to control soil blowing are used.

6. Loamy soils that are 18 to 35 percent clay and less than 5 percent finely divided calcium carbonate, except

silty clay loams. These soils are very slightly erodible, and crops can easily be grown.

7. Silty clay loams that are less than 35 percent clay and less than 5 percent finely divided calcium carbonate. These soils are very slightly erodible, and crops can easily be grown.

8. Stony or gravelly soils and other soils not subject to soil blowing.

Soil and water features

Tables 23 and 24 contain information helpful in planning land uses and engineering projects that are likely to be affected by soil and water features.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are placed in one of four groups on the basis of the intake of water after the soils have been wetted and have received precipitation from long-duration storms. Table 23 gives data for soils on the low detail map, and table 24 gives data for soils on the high detail map.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist chiefly of deep, well drained to excessively drained sands or gravels. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils that have a layer that impedes the downward movement of water or soils that have moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clay soils that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding is the temporary covering of soil with water from overflowing streams, with runoff from adjacent slopes, and by tides. Water standing for short periods after rains or after snow melts is not considered flooding, nor is water in swamps and marshes. Flooding is rated in general terms that describe the frequency and duration of flooding and the time of year when flooding is most likely. The ratings are based on evidence in the soil profile of the effects of flooding, namely thin strata of gravel, sand, silt, or, in places, clay deposited by floodwater; irregular decrease in organic-matter content with increasing depth; and absence of distinctive soil horizons that form in soils of the area that are not subject to flooding. The ratings are also based on local information about floodwater levels in the area and the extent of flooding and on information that relates the position of each soil on the landscape to historic floods.

The generalized description of flood hazards is of value in land-use planning and provides a valid basis for land-use restrictions. The soil data are less specific, however, than those provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

Depth to bedrock is shown for all soils that are underlain by bedrock at a depth of 5 to 6 feet or less. For many soils, the limited depth to bedrock is a part of the definition of the soil series. The depths shown are based on measurements made in many soil borings and on other observations during the mapping of the soils. The kind of bedrock and its hardness as related to ease of excavation is also shown. Rippable bedrock can be excavated with a single-tooth ripping attachment on a 200-horsepower tractor, but hard bedrock generally requires blasting.

Cemented pans are hard subsurface layers, within a depth of 5 or 6 feet, that are strongly compacted (indurated). Such pans cause difficulty in excavation. The hardness of pans is similar to that of bedrock. A rippable pan can be excavated, but a hard pan generally requires blasting.

Potential frost action refers to the likelihood of damage to pavements and other structures by frost heaving and low soil strength after thawing. Frost action results from the movement of soil moisture into the freezing temperature zone in the soil, which causes ice lenses to form. Soil texture, temperature, moisture content, porosity, permeability, and content of organic matter are the most important soil properties that affect frost action. It is assumed that the soil is not covered by insulating vegetation or snow and is not artificially drained. Silty and clayey soils that have a high water table in winter are most susceptible to frost action. Well drained very gravelly or sandy soils are the least susceptible.

Risk of corrosion pertains to potential soil-induced chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to soil moisture, particle-size distribution, total acidity, and electrical conductivity of the soil material. The rate of corrosion of concrete is based mainly on the sulfate content, texture, and acidity of the soil. Protective measures for steel or more resistant concrete help to avoid or minimize damage resulting from the corrosion. Uncoated steel intersecting soil boundaries or soil horizons is more susceptible to corrosion than an installation that is entirely within one kind of soil or within one soil horizon.

Engineering test data

The results of analyses of engineering properties of several typical soils of the survey area are given in table 25.

The data presented are for soil samples that were collected from carefully selected sites. The soil profiles sampled are typical of the series discussed in the section "Soil series and morphology." The soil samples were analyzed by the New Mexico State Highway Department, Materials and Testing Division.

The methods used in obtaining the data are listed by code in the next paragraph. Most of the codes, in parentheses, refer to the methods assigned by the American Association of State Highway and Transportation Officials (*1*). The code for Unified classification is assigned by the American Society for Testing and Materials (*2*).

The methods and codes are AASHTO classification (M-145-66); Unified classification (D-2487-69); mechanical analysis (T88-57); liquid limit (T89-60); plasticity index (T90-56).

Soil series and morphology

In this section, each soil series recognized in the survey area is described in detail. The descriptions are arranged in alphabetic order by series name.

Characteristics of the soil and the material in which it formed are discussed for each series. The soil is then compared to similar soils and to nearby soils of other series. Then a pedon, a small three-dimensional area of soil that is typical of the soil series in the survey area, is described. The detailed descriptions of each soil horizon follow standards in the Soil Survey Manual (*8*). Unless otherwise noted, colors described are for dry soil.

Following the pedon description is the range of important characteristics of the soil series in this survey area. Phases, or mapping units, of each soil series are described in the section "Soil maps for detailed planning."

Alamogordo series

The Alamogordo series consists of deep, well drained soils that formed in calcareous and gypsiferous alluvium. They are on broad uplands, narrow ridgetops, alluvial fans, and pediments. Slope is 0 to 35 percent. The mean annual precipitation is about 8 inches, and the mean annual air temperature is about 61 degrees F.

Alamogordo soils are similar to and near Yesum, Holloman, Reeves, and Aztec soils and are also near the Largo and Prelo soils. Yesum soils are less than 15 percent carbonate and contain more gypsum in the C horizon. Holloman soils overlie gypsum beds at a shallow depth. Reeves soils have a fine-loamy control section and are moderately deep to gypsum. Aztec soils are more than 35 percent gravel in the control section. Largo and Prelo soils have a fine-silty control section and do not have a gypsic horizon.

Typical pedon of Alamogordo very fine sandy loam in an area of Alamogordo-Aztec complex, 1 to 3 percent slopes, NE1/4SE1/4 sec. 29, T. 15 S., R. 10 E.:

A1—0 to 7 inches; light brown (7.5YR 6/4) very fine sandy loam, dark brown (7.5YR 4/4) moist; weak thick and medium platy structure in upper 1 inch, moderate fine and very fine granular structure below; soft, very friable, slightly sticky and slightly plastic; common fine and very fine roots; common very fine tubular pores; strongly calcareous, lime disseminated; moderately alkaline; abrupt smooth boundary.

C1cs—7 to 15 inches; pinkish white (7.5YR 8/2) loam, strong brown (7.5YR 5/6) moist; massive; soft, very friable, slightly sticky and slightly plastic; few very fine roots; few very fine tubular pores; gypsum dominates this layer; strongly calcareous, lime disseminated and a few soft masses; moderately alkaline; clear smooth boundary.

C2—15 to 60 inches; light brown (7.5YR 6/4) very fine sandy loam, brown (7.5YR 4/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; few very fine tubular pores; strongly calcareous, lime disseminated and few fine soft masses of segregated lime; moderately alkaline.

Depth to the C1cs horizon is generally 4 to 8 inches but ranges from 4 to 15 inches. In some areas a desert pavement of gravel covers 20 to 70 percent of the surface. Calcium carbonate content ranges from 15 to 20 percent in the C1cs (gypsic) horizon and from 25 to 30 percent in the A and C2 horizons.

The A horizon has hue of 10YR, 7.5YR, or 5YR; value of 5 or 6 dry and 4 or 5 moist; and chroma of 3 or 4. It is loam, silt loam, very fine sandy loam, fine sandy loam, or sandy loam. It has moderate fine or very fine granular or weak fine or medium subangular blocky structure. In some pedons the upper 1 inch has weak or moderate medium or thick platy structure. Gravel content ranges from 0 to 5 percent.

The C1cs horizon has hue of 10YR or 7.5YR, value of 6 to 8 dry and 5 or 6 moist, and chroma of 2 to 6. It is loam, very fine sandy loam, or fine sandy loam and is more than 25 percent gypsum. The C1cs horizon is massive or has weak, coarse subangular blocky structure. The C2 horizon has hue of 7.5YR or 5YR and value of 5 or 6 dry and 4 or 5 moist. It is loam, very fine sandy loam, or fine sandy loam. This horizon has weak coarse subangular blocky structure or is massive.

Alamogordo Variant

The Alamogordo Variant consists of deep, well drained soils that formed in highly gypsiferous alluvium and

eolian material. They are in slightly depressional areas of basin floors. Slope is 0 to 1 percent. Mean annual precipitation is about 8 inches, and mean annual air temperature is about 61 degrees F.

Alamogordo Variant soils are similar to and near Alamogordo, Yesum, and Reeves soils. They are also near Holloman soils. Alamogordo and Yesum soils do not have a cambic horizon. Reeves soils have a calcic horizon. Holloman soils have a solum less than 20 inches thick over bedded gypsum.

Typical pedon of Alamogordo Variant very fine sandy loam, 0 to 1 percent slopes, SW1/4SE1/4 sec. 20, T. 16 S., R. 9 E.:

A11—0 to 2 inches; light brownish gray (10YR 6/2) very fine sandy loam, brown (10YR 4/3) moist; weak thin and very thin platy structure; soft, very friable, slightly sticky and slightly plastic; common medium, fine, and very fine roots; common fine vesicular pores; strongly calcareous, lime disseminated; moderately alkaline; abrupt smooth boundary.

A12—2 to 6 inches; light brownish gray (10YR 6/2) very fine sandy loam, brown (10YR 4/3) moist; weak very fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common medium, fine, and very fine roots; common fine tubular pores; strongly calcareous, lime disseminated; moderately alkaline; clear smooth boundary.

B21ca—6 to 11 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; weak fine and very fine subangular blocky structure; soft, very friable, sticky and slightly plastic; common fine and very fine roots; common fine tubular pores; strongly calcareous, lime disseminated; moderately alkaline; clear smooth boundary.

B22ca—11 to 15 inches; yellowish brown (10YR 5/4) loam, brown (10YR 4/3) moist; weak fine and very fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common fine and very fine roots; common fine tubular pores; strongly calcareous, lime disseminated; moderately alkaline; clear smooth boundary.

C1cacs—15 to 27 inches; yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 4/4) moist; weak fine and very fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common fine and very fine roots; common fine tubular pores; strongly calcareous, lime disseminated; moderately alkaline; clear smooth boundary.

C2cs—27 to 35 inches; light brown (7.5YR 6/4) very fine sandy loam, brown (7.5YR 4/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; few fine tubular pores; few fine gypsum crystals; moderately calcareous, lime disseminated; moderately alkaline; clear smooth boundary.

C3cs—35 to 60 inches; brown (7.5YR 5/4) very fine sandy loam, dark brown (7.5YR 4/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; few fine tubular pores; moderately calcareous, common fine irregularly shaped soft masses and filaments of lime and gypsum and few fine crystals of gypsum; moderately alkaline.

The A horizon has hue of 10YR or 7.5YR and value of 4 to 6 dry and 3 or 4 moist. It is commonly very fine sandy loam but is loam or silt loam in some pedons.

The B horizon has hue of 10YR or 7.5YR and value of 3 or 4 moist. It is loam or very fine sandy loam.

The C horizon has value of 5 to 7 dry and 4 to 6 moist and chroma of 4 to 6. The gypsum content of the C horizon is high. The gypsum occurs as segregated filaments and soft masses and fine cyrstals.

Armesa series

The Armesa series consists of deep, well drained soils that formed in medium textured alluvium and eolian sediment that are high in carbonate. They are on old alluvial fans and terraces. Slope is 0 to 5 percent. Mean annual precipitation is about 14 inches, and the mean annual air temperature is about 60 degrees F.

Armesa soils are similar to Jal and La Fonda soils. They are near Jerag, Philder, Tencee, Reyab, and Lozier soils. La Fonda soils do not have a calcic horizon. Jal soils are dry in all parts of the moisture control section more than three-fourths of the time (cumulative) that the soil temperature is higher than 41 degrees F and have more than 40 percent calcium carbonate equivalent in the control section (between depths of 10 and 40 inches). Jerag, Philder, and Tencee soils have a petrocalcic horizon at a depth of 20 inches or less. Reyab soils do not have a calcic horizon. Lozier soils are less than 20 inches deep over limestone bedrock.

Typical pedon of the Armesa very fine sandy loam, 0 to 5 percent slopes, about 300 feet north of County Road 506 where it intersects the southwest corner of sec. 10, T. 21 S., R. 11 E.:

A1—0 to 3 inches; brown (10YR 5/3) very fine sandy loam, dark yellowish brown (10YR 4/4) moist; weak thin platy structure in upper 1 inch, weak fine granular structure below; soft, very friable, slightly sticky and nonplastic; common very fine, fine, and medium roots; common fine vesicular pores; moderately calcareous; moderately alkaline; abrupt smooth boundary.

B21—3 to 8 inches; brown (10YR 5/3) sandy clay loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; common very fine and fine and few medium and coarse roots;

common fine tubular pores; moderately calcareous; moderately alkaline; clear smooth boundary.

B22ca—8 to 14 inches; brown (10YR 5/3) sandy clay loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; common very fine and fine and few medium and coarse roots; common fine tubular pores; moderately calcareous, about 8 percent calcium carbonate nodules; moderately alkaline; abrupt wavy boundary.

C1ca—14 to 31 inches; white (10YR 8/2) silty clay loam, very pale brown (10YR 7/3) moist; massive; extremely hard, very firm, slightly sticky and slightly plastic; few fine, medium, and coarse roots; few fine tubular pores; strongly calcareous; moderately alkaline; clear wavy boundary.

C2ca—31 to 36 inches; very pale brown (10YR 8/3) gravelly silty clay loam, very pale brown (10YR 7/3) moist; massive; extremely hard, very firm, slightly sticky and nonplastic; few fine, medium, and coarse roots; few fine tubular pores; 15 percent gravel; strongly calcareous; moderately alkaline; abrupt wavy boundary.

C3ca—36 to 60 inches; pink (7.5YR 7/4) gravelly sandy clay loam, strong brown (7.5YR 5/6) moist; massive; soft, very friable, slightly sticky and nonplastic; few coarse roots; few fine tubular pores; 15 percent gravel; moderately calcareous; moderately alkaline.

The A horizon has value of 5 or 6 dry and 3 or 4 moist. It is very fine sandy loam or loam.

The B horizon has value of 5 or 6 dry and 4 or 5 moist. It is sandy clay loam, very fine sandy loam, or loam. The lower part of this horizon has an increase in calcium carbonate equivalent.

The Cca horizon is silt loam, gravelly silt loam, gravelly sandy clay loam, silty clay loam, or gravelly silty clay loam. It is 0 to 20 percent gravel.

Aztec series

The Aztec series consists of deep, well drained soils that formed in mixed gravelly alluvium and gypsiferous eolian sediment. These soils are on side slopes of pediments and on alluvial fans. Slope is 1 to 65 percent. The mean annual precipitation is about 10 inches, and the mean annual air temperature is about 61 degrees F.

Aztec soils are similar to and near Nickel soils and are near Alamogordo, Tome, Largo, Prelo, Lozier, Pena, Ector, Deama, Gabaldon, and Shanta soils. Nickel soils do not have a gypsic horizon. Alamogordo, Tome, Largo, and Prelo soils do not have gravel in the control section (between depths of 10 and 40 inches). Lozier soils have lithic contact at a depth of less than 20 inches. Pena soils have a mesic temperature regime. Ector and Deama soils are carbonatic and have lithic contact at a depth of less than 20 inches. Gabaldon soils are less than 15 percent fine or coarser sand in the control section (between depths of 10 and 40 inches), and have a mesic temperature regime. Shanta soils have a mesic temperature regime and contain less than 20 percent coarse fragments in the control section (between depths of 10 and 40 inches).

Typical pedon of Aztec sandy loam in an area of Alamogordo-Gypsum land-Aztec complex, 15 to 50 percent slopes, 1 mile north of Three Rivers on the west side of U.S. Highway 54, NW1/4SE1/4 sec. 21, T. 11 S., R. 9 E.:

A1—0 to 5 inches; light gray (10YR 7/2) sandy loam, brown (10YR 5/3) moist; weak medium granular structure; slightly hard, very friable, nonsticky and nonplastic; common fine and very fine roots; common very fine interstitial pores; about 12 percent gravel; moderately calcareous, lime disseminated and small soft masses; desert pavement covers about 90 percent of the surface; moderately alkaline; abrupt smooth boundary.

C1ca—5 to 16 inches; white (10YR 8/2) gravelly sandy loam, light gray (10YR 7/2) moist; massive; slightly hard, friable, nonsticky and nonplastic; few very fine and fine roots; few very fine tubular pores; 25 percent gravel; strongly calcareous, lime disseminated; moderately alkaline; gradual smooth boundary.

C2ca—16 to 26 inches; light gray (10YR 7/2) very gravelly sandy loam, brown (10YR 5/3) moist; massive; slightly hard, friable, nonsticky and nonplastic; few very fine and fine roots; few very fine tubular pores; 35 percent gravel; strongly calcareous, lime disseminated; moderately alkaline; clear smooth boundary.

C3csca—26 to 31 inches; very pale brown (10YR 7/3) very gravelly sandy loam, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine tubular pores; 50 percent gravel; strongly calcareous, lime disseminated; moderately alkaline; gradual smooth boundary.

C4csca—31 to 45 inches; very pale brown (10YR 7/3) very gravelly loamy sand, pale brown (10YR 6/3) moist; single grain; loose dry and moist, nonsticky and nonplastic; few very fine interstitial pores; 60 percent gravel; moderately calcareous, many large crystals of gypsum; moderately alkaline; clear smooth boundary.

C5—45 to 60 inches; very pale brown (10YR 7/3) extremely gravelly loamy sand, pale brown (10YR 6/3) moist; single grain; loose dry and moist, nonsticky and nonplastic; few very fine interstitial pores; 70 percent gravel; many large gypsum crystals; slightly calcareous; mildly alkaline.

A desert pavement covers 70 to 90 percent of the surface.

The A horizon has hue of 5YR, 7.5YR, or 10YR; value of 6 or 7 dry; and chroma of 2 to 4 dry and 3 or 4 moist.

It is gravelly fine sandy loam, gravelly very fine sandy loam, gravelly sandy loam, gravelly loam, or sandy loam. This soil contains 10 to 30 percent gravel.

The C horizon has hue of 5YR, 7.5YR, or 10YR; value of 6 to 8 dry and 4 to 7 moist; and chroma of 2 or 3. It is gravelly loam, gravelly sandy loam, very gravelly sandy loam, very gravelly fine sandy loam, gravelly loamy sand, very gravelly loamy sand, or extremely gravelly loamy sand. Gravel content ranges from 25 to 70 percent in the individual layers but averages more than 40 percent in the control section.

Aztec Variant

The Aztec Variant consists of deep, well drained soils that formed in mixed alluvium and gypsiferous sediment. They are on side slopes of pediments and on alluvial fans. Slope is 3 to 45 percent. The mean annual precipitation is about 15 inches, and the mean annual air temperature is 55 degrees F.

Aztec Variant soils are similar to and near Aztec, Nickel, and Alamogordo soils and are near Pena and Deama soils. Aztec soils have a lighter colored A horizon, warmer temperature, and less rainfall. Nickel soils do not have a gypsic horizon and are warmer and dryer. Alamogordo soils contain less than 15 percent gravel throughout the profile and are warmer and dryer. Pena soils do not have a gypsic horizon and Deama soils have lithic contact at a depth of less than 20 inches and do not have a gypsic horizon.

Typical pedon of Aztec Variant gravelly fine sandy loam in an area of Pena-Aztec Variant association, strongly sloping, 1 mile east of Bent post office on U.S. Highway 70 and 500 yards north of road:

A1—0 to 8 inches; pale brown (10YR 6/3) gravelly fine sandy loam, dark brown (10YR 4/3) moist; weak medium granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; common very fine interstitial pores; about 20 percent gravel; moderately calcareous, lime disseminated; desert pavement of about 75 percent gravel and 5 percent cobbles is on the surface; moderately alkaline; abrupt wavy boundary.

C1csca—8 to 31 inches; very pale brown (10YR 7/3) very gravelly sandy loam, pale brown (10YR 6/3) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; common very fine tubular pores; 35 percent gravel; about 35 percent large crystals and masses of gypsum; strongly calcareous; moderately alkaline; clear wavy boundary.

C2—31 to 60 inches; very pale brown (10YR 7/3) very gravelly sandy loam, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; few very fine tubular pores; 50 percent gravel; about 20 percent large crystals and soft masses of gypsum; strongly calcareous; moderately alkaline.

These soils contain 35 to 55 percent gravel in the control section and are high in gypsum. A desert pavement of gravel and some cobbles covers 70 to 90 percent of the surface.

The A horizon has hue of 7.5YR or 10YR, value of 5 to 7 dry and 3 or 4 moist, and chroma of 2 to 4. It is gravelly fine sandy loam or gravelly sandy loam.

The C1csca horizon has hue of 10YR or 7.5YR, value of 7 or 8 dry and 6 or 7 moist, and chroma of 2 or 3. It is very gravelly sandy loam or very gravelly fine sandy loam. This horizon is 30 to 40 percent gypsum. The C2 horizon has hue of 7.5YR or 10YR, value of 6 or 7 dry and 5 or 6 moist, and chroma of 2 or 3. It is very gravelly sandy loam or very gravelly fine sandy loam. This horizon is 15 to 20 percent gypsum.

Berino series

The Berino series consists of deep, well drained soils that formed in medium textured upland alluvium and eolian deposits. They are on nearly level to undulating sandy plains and side slopes of pediments. Slope is 0 to 5 percent. Mean annual precipitation is about 9 inches, and the mean annual air temperature is about 63 degrees F.

Berino soils are similar to and near Dona Ana soils. They are near Pintura, Tome, and Bluepoint soils. Dona Ana soils are calcareous throughout. Pintura and Bluepoint soils do not have a calcic horizon and do have a sandy control section. Tome soils do not have a calcic horizon and do have a fine-silty control section.

Typical pedon of Berino sandy loam in an area of Dona Ana-Berino association, gently sloping, about 600 yards east of U.S. Highway 54 along the southern boundary of sec. 36, T. 20 S., R. 9 E.:

A1—0 to 3 inches; light reddish brown (5YR 6/4) sandy loam, reddish brown (5YR 5/4) moist; weak medium granular structure; slightly hard, friable, slightly sticky and nonplastic; few fine and very fine roots; common fine interstitial and few fine tubular pores; mildly alkaline; clear smooth boundary.

B21t—3 to 15 inches; reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) moist; weak medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; few fine and medium roots; common fine and very fine tubular pores; common clay bridging of sand grains, few thin clay films coating pores; mildly alkaline; clear smooth boundary.

B22t—15 to 27 inches; reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) moist; weak medium prismatic structure parting to weak and

moderate medium subangular blocky; hard, firm, sticky and plastic; few fine roots; common interstitial pores; common clay bridging of sand grains and thin clay films in old root channels and some pores; moderately alkaline; clear wavy boundary.

B23tca—27 to 36 inches; light reddish brown (5YR 6/4) sandy clay loam, reddish brown (5YR 5/4) moist; weak medium prismatic structure parting to weak medium subangular blocky; hard, firm, slightly sticky and slightly plastic; few fine roots; common interstitial and few fine tubular pores; few thin clay films lining pores; strongly calcareous, carbonates in soft masses; moderately alkaline; clear wavy boundary.

Cca—36 to 60 inches; pink (7.5YR 7/4) sandy clay loam, light brown (7.5YR 6/4) moist; massive; hard, firm, slightly sticky and nonplastic; few fine tubular pores; strongly calcareous; moderately alkaline.

The solum ranges from 23 to 49 inches in thickness. The solum is 0 to 10 percent coarse fragments. Reaction ranges from mildly alkaline to moderately alkaline. In some pedons as much as 20 inches of coarse textured wind deposited material is on the surface.

The A horizon has hue of 7.5YR or 5YR, value of 5 or 6 dry and 4 or 5 moist, and chroma of 3 or 4. It is very fine sandy loam, fine sandy loam, sandy loam, or light sandy clay loam. The A horizon has been removed in some pedons, leaving the upper part of the B horizon exposed.

The B2t horizon has hue of 7.5YR or 5YR, value of 5 to 6 in the upper part and 5 to 7 in the lower parts dry and 4 or 5 moist, and chroma of 3 or 4. It is sandy clay loam or heavy sandy loam. The lower part of the B2t horizon is calcareous in most pedons (B23tca), but in some pedons only a small amount of calcium carbonate is present above the Cca horizon.

The Cca horizon has hue of 7.5YR or 5YR, value of 6 to 8 dry and 5 to 7 moist, and chroma of 2 to 4. Texture is light sandy clay loam, clay loam, or sandy loam, depending on the amount of carbonate present.

About 50 percent of the soils mapped as Berino soils in the survey area have hue of 7.5YR, which is outside the range defined for the Berino series, but this difference does not affect the use and behavior of the soils.

Bluepoint series

The Bluepoint series consists of deep, somewhat excessively drained soils that formed in coarse textured eolian deposits. They are on coppice dunes on sandy uplands. Slope is 0 to 5 percent. The mean annual precipitation is about 8 inches, and the mean annual air temperature is about 63 degrees F.

Bluepoint soils are similar to and near Pintura soils. They are near Berino, Holloman, Onite, and Wink soils. Pintura soils are less than 10 percent silt plus clay in the control section. Berino and Onite soils have an argillic horizon. Holloman soils are less than 20 inches deep over bedded gypsum. Wink soils have a coarse-loamy control section and have a B horizon.

Typical pedon of Bluepoint loamy fine sand in an area of Bluepoint-Onite-Wink association, nearly level, about 5 miles north of Three Rivers and about 350 yards east of U.S. Highway 54, NW1/4E1/2 sec. 3, T. 11 S., R. 9 E.:

A1—0 to 8 inches; light reddish brown (5YR 6/4) loamy fine sand, reddish brown (5YR 5/4) moist; single grain; loose dry and moist; common fine and medium roots; common very fine interstitial pores; slightly calcareous, lime disseminated; mildly alkaline; gradual smooth boundary.

C1—8 to 18 inches; light reddish brown (5YR 6/4) loamy fine sand, reddish brown (5YR 5/4) moist; single grain; loose dry and moist; few fine and medium roots; common very fine interstitial pores; strongly calcareous, lime disseminated; mildly alkaline; clear wavy boundary.

C2—18 to 30 inches; light brown (7.5YR 6/4) loamy fine sand, brown (7.5YR 5/4) moist; massive; slightly hard, very friable; few medium roots; common very fine interstitial pores; moderately calcareous, lime disseminated; moderately alkaline; gradual wavy boundary.

C3—30 to 60 inches; light brown (7.5YR 6/4) loamy sand, brown (7.5YR 5/4) moist; massive; soft, very friable; few coarse roots; common very fine interstitial pores; moderately calcareous, few fine soft masses of lime; moderately alkaline.

Bluepoint soils have hue of 5YR or 7.5YR, value of 5 to 7 dry and 4 or 5 moist, and chroma of 3 or 4. The control section is loamy fine sand or loamy sand. Small strata of sandy loam are common in some pedons but are normally thin and discontinuous. The soil is calcareous throughout in most pedons but is always calcareous in some stratum. In some areas the soil may be leached of carbonates to a depth of 5 inches.

Borrego series

The Borrego series consists of shallow, well drained soils that formed in material weathered from sandstone. They are on ridges, mesas, and foothills. Borrego soils are at the highest elevations in the Guadalupe Mountains. Slope is 15 to 40 percent. Mean annual precipitation is about 20 inches, and the mean annual air temperature is about 45 degrees F.

Borrego soils are associated with Tortugas, Dye, Encierro, and Deama soils. All of those soils are mesic.

Typical pedon of Borrego cobbly loam, 15 to 40 percent slopes, NE1/4NE1/4 sec. 28, T. 26 S., R. 21 E.:

O1—1 inch to 0; undecomposed pine needles.

A1—0 to 5 inches; light brownish gray (10YR 6/2) cobbly loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and slightly plastic; many very fine roots; many very fine vesicular and interstitial pores; 25 percent gravel and cobbles; neutral; abrupt smooth boundary.

B1—5 to 7 inches; very pale brown (10YR 7/3) gravelly clay loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; many very fine and common coarse roots; many very fine vesicular and interstitial pores; 30 percent gravel; slightly acid; clear smooth boundary.

B21t—7 to 9 inches; very pale brown (10YR 8/3) gravelly clay loam, strong brown (7.5YR 5/6) moist; moderate fine subangular blocky structure; hard, friable, sticky and plastic; common very fine and coarse roots; many very fine vesicular and interstitial pores; few thin clay films on faces of peds and lining pores; 30 percent gravel; slightly acid; clear smooth boundary.

B22t—9 to 16 inches; reddish yellow (7.5YR 6/6) gravelly clay, strong brown (7.5YR 5/6) moist; strong medium subangular blocky structure; hard, firm, sticky and plastic; common very fine and coarse and few medium roots; many very fine vesicular, interstitial and tubular pores; many moderately thick clay films on faces of peds and lining pores; 35 percent gravel; medium acid; very abrupt irregular boundary.

R—16 inches; hard, noncalcareous sandstone.

The solum ranges from 10 to 20 inches in thickness. The solum is 5 to 35 percent, by volume, coarse fragments. Reaction ranges from neutral to medium acid.

The A1 horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2. It is stony very fine sandy loam to cobbly loam.

The B2t horizon has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 3 to 6. It ranges from gravelly clay to gravelly clay loam.

Cale series

The Cale series consists of deep, well drained soils that formed in highly calcareous fine and medium textured sediment derived from weathered limestone. They are on broad dissected upland valleys. Slope is 0 to 5 percent. The mean annual precipitation is about 13 inches, and the mean air temperature is is 51 degrees F.

Cale soils are similar to Ruidoso, Shanta, and Gabaldon soils and are near Deama, Ector, Kerrick, and Pena soils. Ruidoso soils have a thick mollic epipedon and a fine control section. Shanta and Gabaldon soils do not have an argillic horizon. Deama and Ector soils do not have an argillic horizon and are shallow over bedrock. Kerrick soils are moderately deep to a petrocalcic horizon. Pena soils do not have an argillic horizon and contain more than 35 percent gravel in the control section.

Typical pedon of Cale silt loam in an area of Pena-Cale-Kerrick association, nearly level, 100 feet north and 90 feet east of the southwest corner of the NW1/4 sec. 5, T. 20 S., R. 15 E.:

A1—0 to 6 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, friable, sticky and plastic; common fine and very fine roots; common very fine interstitial pores; moderately calcareous; mildly alkaline; abrupt smooth boundary.

B1—6 to 13 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky and fine and medium granular structure; slightly hard, firm, sticky and plastic; common fine and very fine roots; few fine tubular pores; strongly calcareous; mildly alkaline; abrupt smooth boundary.

B21t—13 to 22 inches; grayish brown (10YR 5/2) silty clay loam, dark brown (10YR 3/3) moist; moderate fine and medium subangular blocky structure; hard, firm, sticky and plastic; few very fine roots; few very fine tubular pores; strongly calcareous, few fine threads of lime; moderately alkaline; gradual smooth boundary.

B22t—22 to 33 inches; grayish brown (10YR 5/2) silty clay loam, dark brown (10YR 3/3) moist; moderate fine and medium subangular blocky structure; hard, firm, sticky and plastic; very few very fine roots; few very fine tubular pores; strongly calcareous, lime segregated in few medium threads and disseminated; moderately alkaline; abrupt smooth boundary.

B3ca—33 to 45 inches; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4) moist; many medium distinct white mottles; moderate fine and medium subangular blocky structure; hard, firm, sticky and plastic; very few very fine roots; few very fine tubular pores; strongly calcareous; moderately alkaline; gradual smooth boundary.

C—45 to 60 inches; light brown (7.5YR 6/4) loam, brown (7.5YR 5/4) moist; massive; hard, firm, sticky and plastic; no roots; few very fine tubular pores; strongly calcareous; moderately alkaline.

The solum ranges from 35 to 52 inches in thickness.

The A horizon has hue of 10YR, value of 4 or 5 dry and 3 or 4 moist, and chroma of 2 or 3 dry or moist. This horizon is commonly silt loam or heavy loam.

The B1 horizon has value of 4 or 5 dry and 2 or 3 moist and chroma of 2 or 3. It is silt loam or light silty clay loam. The B2t horizon has hue of 10YR or 7.5YR, value of 4 or 5 dry and 3 or 4 moist, and chroma of 2 to 4. This horizon is typically silty clay loam, but in some pedons it is clay loam or silt loam. The B3ca horizon has

value of 4 or 5 dry and 3 or 4 moist. This horizon is clay loam or silt loam. Typically, the B3ca horizon contains few to common soft accumulations of segregated lime, but segregated lime is absent in some pedons.

The C horizon has value of 4 to 6 moist and chroma of 3 or 4. It is silty clay loam to sandy loam.

Crowflats series

The Crowflats series consists of deep, well drained soils that formed in calcareous mixed alluvium. Crowflats soils are on basin floors. Slope is 0 to 2 percent. Mean annual precipitation is about 9 inches, and the mean annual air temperature is about 64 degrees F.

Crowflats soils are similar to Tome and Reyab soils and are near Holloman, Reeves, and Tome soils. Tome soils are more dry and have regular decrease in organic matter content with depth. Reyab soils are not flooded so often and have a regular decrease in organic matter content. Holloman soils are shallow to bedded gypsum. Reeves soils have gypsic mineralogy.

Typical pedon of Crowflats silt loam, 0 to 2 percent slopes, SE1/4 sec. 19, T. 22 S., R. 18 E.:

A1—0 to 4 inches; pale brown (10YR 6/3) silt loam dark grayish brown (10YR 4/2) moist; weak thick platy and weak coarse and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine roots; common very fine tubular pores; strongly calcareous, disseminated lime; moderately alkaline; abrupt smooth boundary.

C1—4 to 9 inches; brown (10YR 5/3) silt loam, dark brown (10YR 3/3) moist; moderate fine and very fine subangular blocky structure; slightly hard, friable, sticky and slightly plastic; many fine and very fine roots; common fine and very fine tubular pores; strongly calcareous, lime disseminated; moderately alkaline; abrupt smooth boundary.

C2—9 to 13 inches; pale brown (10YR 6/3) silt loam, dark brown (10YR 4/3) moist; weak coarse and medium subangular blocky structure; slightly hard, friable, sticky and slightly plastic; many very fine and fine roots; common very fine tubular pores; strongly calcareous, lime disseminated; moderately alkaline; clear smooth boundary.

C3—13 to 17 inches; brown (10YR 5/3) silt loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium subangular blocky and weak thin and medium platy structure; slightly hard, friable, sticky and slightly plastic; many fine and very fine roots; common fine and very fine tubular pores; strongly calcareous, lime disseminated; mildly alkaline; clear smooth boundary.

C4—17 to 28 inches; pale brown (10YR 6/3) loam, dark brown (10YR 4/3) moist; weak fine and medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many fine and very fine roots; few fine and very fine tubular pores; strongly calcareous, lime disseminated; moderately alkaline; clear smooth boundary.

C5—28 to 60 inches; brown (10YR 5/3) silt loam, very dark grayish brown (10YR 3/2) moist; moderate medium and fine subangular blocky structure; slightly hard, friable, sticky and slightly plastic; many fine and very fine roots; common fine and very fine tubular pores; strongly calcareous, lime disseminated; moderately alkaline.

The family control section is 18 to 27 percent clay and less than 15 percent fine sand or coarser particles. The soil is slightly stratified and has an irregular decrease in organic matter content with depth. The soil is mildly alkaline to moderately alkaline.

The A horizon has value of 5 or 6 dry and 3 or 4 moist and chroma of 2 or 3. It is silt loam, loam, or very fine sandy loam. It has weak or moderate thin, medium, or thick platy structure or weak or moderate coarse, medium, or fine subangular blocky structure.

The C horizon is stratified silt loam, loam and very fine sandy loam. In many pedons it has very thin strata varying in texture from silty clay loam to sand. The C horizon has weak thin or medium platy structure or weak or moderate very fine, fine, medium, or coarse subangular blocky structure or is massive.

Deama series

The Deama series consists of shallow, well drained soils that formed in residuum from limestone bedrock. They are on steep limestone hills. Slope is 0 to 50 percent. The mean annual precipitation is about 14 inches, and the mean annual air temperature is about 51 degrees F.

Deama soils are similar to Lozier, Tortugas, and Ector soils and are near the Ector, Holloman Variant, Kerrick, Pena, Tortugas, Shanta, and Cale soils. Lozier soils do not have a mollic epipedon. Tortugas soils do not have a calcic horizon. Ector soils have a thermic temperature regime. Holloman Variant soils are gravelly loam less than 20 inches thick over gypsum. Kerrick soils have a petrocalcic horizon. Pena soils are deep. Shanta soils have a fine-loamy control section. Cale soils have an argillic horizon and are less than 15 percent fine sand or coarser particles in the control section.

Typical pedon of Deama very gravelly loam in an area of Deama-Rock outcrop complex, 20 to 50 percent slopes, north of Pinon, northwest corner of NE1/4SW1/4 sec. 9, T. 19 S., R. 15 E.:

A1—0 to 4 inches; brown (10YR 4/3) very gravelly loam, very dark grayish brown (10YR 3/2) moist; weak very fine granular structure; soft, very friable, slightly sticky and nonplastic; common fine and very fine roots; common fine interstitial pores; 40 percent

gravel; strongly calcareous; moderately alkaline; clear wavy boundary.

C1ca—4 to 7 inches; dark grayish brown (10YR 4/2) very gravelly clay loam, very dark grayish brown (10YR 3/2) moist; weak very fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; few very fine interstitial pores; 35 percent gravel; strongly calcareous; moderately alkaline; clear wavy boundary.

C2ca—7 to 14 inches; brown (10YR 4/3) very gravelly clay loam, dark brown (10YR 3/3) moist; weak very fine granular and subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; few very fine interstitial pores; 60 percent gravel; strongly calcareous; moderately alkaline; abrupt wavy boundary.

R—14 inches; limestone bedrock, partially fractured on surface.

Limestone bedrock is at a depth of 7 to 20 inches.

The A horizon has hue of 10YR or 7.5YR, value of 3 to 5 dry and 3 or 4 moist, and chroma of 2 or 3. This horizon is gravelly loam, cobbly loam, very gravelly loam, or very gravelly sandy loam. It is more than 35 percent coarse fragments.

The Cca horizon has value of 3 to 5 dry and chroma of 2 or 3. The Cca horizon is very gravelly loam, very gravelly silt loam, very gravelly clay loam, or very gravelly silty clay loam. The gravel content ranges from 35 to 65 percent. This horizon is 40 to 60 percent carbonate.

Dona Ana series

The Dona Ana series consists of deep, well drained soils that formed in medium and coarse textured eolian material and alluvium. They are on toe slopes of pediments and on sandy uplands. Slope is 0 to 5 percent. The mean annual precipitation is about 9 inches, and the mean annual air temperature is about 63 degrees F.

Dona Ana soils are similar to and near Berino soils and are near Pintura, Bluepoint, and Tome soils. Berino soils are noncalcareous in the upper horizons. Pintura and Bluepoint soils do not have a calcic horizon and have a sandy control section. Tome soils do not have a calcic horizon and have a fine-silty control section.

Typical pedon of Dona Ana fine sandy loam in an area of Pintura-Dona Ana complex, 0 to 5 percent slopes, 5 miles north of Orogrande along bar ditch on U.S. Highway 54, sec. 30, T. 20 S., R. 9 E.:

A1—0 to 3 inches; reddish brown (5YR 5/3) fine sandy loam, reddish brown (5YR 4/4) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few fine and medium roots; few fine tubular pores; strongly calcareous, carbonates disseminated and as soft masses; moderately alkaline; clear smooth boundary.

B21tca—3 to 10 inches; reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) moist; weak to moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and medium roots; common fine interstitial and few fine tubular pores; common clay bridging of sand grains and few thin clay films in root channels and lining pores; strongly calcareous, lime as soft masses and few nodules; moderately alkaline; clear smooth boundary.

B22tca—10 to 16 inches; reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) moist; weak medium prismatic structure parting to moderate fine and medium subangular blocky; hard, friable, slightly sticky and slightly plastic; few fine roots; few fine interstitial pores and common fine tubular pores; common clay bridging of sand grains and few thin clay films lining pores and root channels; strongly calcareous, carbonates as filaments and disseminated; moderately alkaline; clear smooth boundary.

B23tca—16 to 21 inches; reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine roots; few fine tubular pores; few thin clay films lining pores; strongly calcareous, carbonates coating most ped surfaces and few nodules and common soft masses in lower part; moderately alkaline; clear wavy boundary.

C1ca—21 to 37 inches; pinkish gray (5YR 7/2) sandy clay loam, light reddish brown (5YR 6/4) moist; massive; hard, firm, slightly sticky and nonplastic; no roots; common fine tubular pores; strongly calcareous, carbonates almost plugging horizon and as soft masses, nodules, and thick coats; moderately alkaline; clear wavy boundary.

C2ca—37 to 60 inches; light reddish brown (5YR 6/4) sandy loam, reddish brown (5YR 5/4) moist; massive; hard, very friable, nonsticky and nonplastic; no roots; few fine tubular pores; strongly calcareous, carbonates as soft masses and filaments; moderately alkaline.

The solum ranges from 15 to 30 inches in thickness. Coarse fragments make up less than 5 percent of any one horizon. Patches of desert pavement less than one inch thick cover some pedons.

The A horizon has hue of 7.5YR or 5YR and value of 5 to 7 dry and 3 or 4 moist. Texture is very fine sandy loam, fine sandy loam, sandy loam, or sandy clay loam. In many pedons the A horizon has been removed by erosion and a thin layer of wind-deposited material is on the surface.

The B2t horizon has hue of 7.5YR or 5YR, value of 5 or 6 dry and 4 or 5 moist, and chroma of 3 or 4. It is sandy clay loam in all parts except in a few pedons

where the upper part is heavy sandy loam. About one-half of the pedons have a B3ca horizon.

The Cca horizon has hue of 7.5YR or 5YR and value of 6 to 8 dry and 5 to 7 moist.

Dye series

The Dye series consists of shallow, well drained soils that formed in residuum from sandstone. Dye soils are on upland plains. Slope is 5 to 30 percent. The mean annual precipitation is about 15 inches, and the mean annual air temperature is about 52 degrees F.

Dye soils are near Tortugas, Encierro, and Deama soils. Tortugas soils have a loamy-skeletal control section. Tortugas, Encierro, and Deama soils have a mollic epipedon.

Typical pedon of Dye clay loam in an area of Dye-Encierro complex, 5 to 30 percent slopes, NW1/4SW1/4 sec. 21, T. 24 S., R. 22 E.:

A1—0 to 1 inch; strong brown (7.5YR 5/6) loam, dark yellowish brown (10YR 3/4) moist; weak thin platy structure; soft, very friable, slightly sticky and slightly plastic; common very fine and fine roots; many fine interstitial pores; moderately alkaline; abrupt smooth boundary.

B1—1 inch to 4 inches; yellowish brown (10YR 5/4) clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; many fine interstitial pores; moderately alkaline; clear wavy boundary.

B2t—4 to 17 inches; brown (7.5YR 5/4) clay loam, reddish brown (5YR 4/4) moist; strong medium angular blocky structure; hard, firm, sticky and plastic; few very fine and fine roots; common fine interstitial pores; few thin clay films on faces of peds and lining pores; moderately alkaline; abrupt irregular boundary.

R—17 inches; pale brown and light brown (10YR 6/3 and 7.5YR 6/4) sandstone bedrock.

The solum ranges from 10 to 20 inches in thickness.

The A1 horizon is strong brown or light yellowish brown loam or clay loam. Gravel content ranges from none to about 30 percent, by volume.

The B2t horizon is brown or very pale brown and ranges from clay to clay loam.

Ector series

The Ector series consists of shallow, well drained soils that formed in material weathered from limestone bedrock. Ector soils are on sides of steep limestone hills and on mesas and plateaus dissected by narrow drainageways. Slope is 20 to 50 percent. Mean annual precipitation is about 15 inches, and mean annual air temperature is about 60 degrees F.

Ector soils are similar to and near Deama and Lozier soils. They are also near Kerrick, Pena, and Cale soils. Deama soils have a mean annual soil temperature of less than 59 degrees F. Lozier soils do not have a mollic epipedon and are more dry. Kerrick soils have a petrocalcic horizon. Pena and Cale soils are deep.

Typical pedon of Ector gravelly loam in an area of Ector-Rock outcrop complex, 20 to 50 percent slopes, sec. 15, T. 20 S., R. 15 E.:

A1—0 to 9 inches; grayish brown (10YR 5/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate medium and fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; many very fine and fine interstitial pores; 30 percent gravel; strongly calcareous; moderately alkaline; abrupt smooth boundary.

Cca—9 to 17 inches; light gray (10YR 7/1) extremely gravelly loam, light brownish gray (10YR 6/2) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; many fine interstitial pores; 70 percent gravel; strongly calcareous; moderately alkaline; abrupt smooth boundary.

R—17 inches; fractured limestone bedrock; coatings of calcium carbonate in fractures of first several inches of bedrock; few fine roots in fractures.

Limestone bedrock is at a depth of 8 to 18 inches. Content of coarse fragments ranges from 30 to 70 percent. In some pedons there are fractures in the upper few inches of the limestone which are normally filled with precipitated carbonates.

The A horizon has value of 4 or 5 dry. The A horizon is dominantly gravelly loam but in some pedons is clay loam or silt loam containing 30 percent or more coarse fragments.

The Cca horizon is variable in color but normally has value of 7 or 8 dry and 6 or 7 moist.

Emot series

The Emot series consists of deep, well drained soils that formed in alluvium and colluvium from siltstone, shale, and limestone. They are on foot slopes of pediments. Slope is 0 to 3 percent. The mean annual precipitation is about 10 inches, and the mean annual air temperature is about 61 degrees F.

Emot soils are similar to Largo, Ogral, and Tome soils and are near Tome, Nickel, and Largo soils. Largo and Tome soils have a fine-silty control section. Nickel soils have a calcic horizon. Ogral soils have coarser texture.

Typical pedon of Emot gravelly fine sandy loam in an area of Tome-Emot complex, 0 to 3 percent slopes, SW1/4NW1/4 sec. 5, T. 16 S., R. 10 E.:

A1—0 to 4 inches; brown (7.5YR 5/4) gravelly fine sandy loam, dark brown (7.5YR 4/4) moist; moderate very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; very few fine roots; few fine tubular pores; 15 percent rounded limestone gravel; desert pavement covers 30 percent of the surface; strongly calcareous; moderately alkaline; abrupt smooth boundary.

AC—4 to 11 inches; brown (7.5YR 5/4) gravelly very fine sandy loam, dark brown (7.5YR 4/4) moist; massive; soft, very friable, slightly sticky and nonplastic; common very fine and fine roots; common fine tubular pores; 25 percent rounded limestone gravel; strongly calcareous; moderately alkaline; abrupt smooth boundary.

C—11 to 60 inches; brown (7.5YR 5/4) extremely gravelly silt loam, dark brown (7.5YR 4/4) moist; massive; soft, very friable, slightly sticky and slightly plastic; few very fine and fine roots; few fine tubular pores; 60 percent rounded limestone gravel and 5 percent rounded limestone cobbles; strongly calcareous; moderately alkaline.

The A horizon has hue of 10YR or 7.5YR, value of 5 or 6 dry and 4 or 5 moist, and chroma of 2 to 4. It is fine sandy loam or gravelly fine sandy loam. In most pedons a desert pavement covers 2 to 40 percent of the surface. Gravel content ranges from 5 to 25 percent, by volume.

The AC horizon has hue of 10YR or 7.5YR, value of 5 or 6 dry and 3 or 4 moist, and chroma of 3 or 4. It is very fine sandy loam or gravelly very fine sandy loam. Gravel content ranges from 10 to 30 percent, by volume.

The C horizon has hue of 10YR or 7.5YR, value of 5 to 7 dry and 4 or 5 moist, and chroma of 3 or 4. Gravel content ranges from 45 to 60 percent, by volume.

Encierro series

The Encierro series consists of shallow, well drained soils that formed in material weathered from sandstone and interbedded dolomite with some additions of eolian material. Encierro soils are on upland hills and mesa tops. Slope is 5 to 30 percent. The mean annual precipitation is about 16 inches and the mean annual temperature is about 52 degrees F.

Encierro soils are near Dye, Tortugas, Deama, and Montecito soils. Dye soils have an ochric epipedon. Tortugas and Deama soils do not have an argillic horizon. Montecito soils are deep.

Typical pedon of Encierro loam in an area of Dye-Encierro complex, 5 to 30 percent slopes, SW1/4NE1/4 sec. 26, T. 24 S., R. 21 E.:

A1—0 to 2 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; strong medium platy structure; soft, very friable, slightly sticky and slightly plastic; many very fine roots; many very fine interstitial pores; mildly alkaline; abrupt smooth boundary.

B21t—2 to 6 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; many very fine and few coarse roots; many very fine interstitial and tubular pores; few thin clay films on faces of peds; 10 percent coarse gravel and cobbles; mildly alkaline; clear smooth boundary.

B22t—6 to 13 inches; grayish brown (10YR 5/2) gravelly clay, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure parting to weak coarse granular; slightly hard, friable, sticky and plastic; many very fine roots; many very fine interstitial and tubular pores; few thin clay films on faces of peds; 20 percent coarse gravel and cobbles; strongly calcareous; moderately alkaline; abrupt irregular boundary.

R—13 inches; interbedded dolomite and sandstone bedrock.

The solum ranges from 10 to 20 inches in thickness. Reaction ranges from mildly alkaline to moderately alkaline.

The A horizon is dark brown or dark grayish brown gravelly loam to clay loam.

The B2t horizon is dark reddish brown to grayish brown.

Bedrock is fractured limestone, dolomite, and sandstone.

Espy series

The Espy series consists of well drained soils that formed in mixed alluvium. They are shallow over indurated caliche. Espy soils are on alluvial fans and terraces. Slope is 0 to 5 percent. The mean annual precipitation is about 12 inches, and the mean annual air temperature is about 61 degrees F.

Espy soils are similar to Deama, Ector, Jerag, Kerrick, and Philder soils. They are near Shanta Variant, Ector, and Lozier soils. Deama and Ector soils have limestone bedrock at a depth of less than 20 inches. Jerag soils do not have a mollic epipedon and do have an argillic horizon above the petrocalcic horizon. Kerrick soils have a petrocalcic horizon at a depth of 20 to 30 inches. Philder soils have a skeletal control section and do not have a mollic epipedon. Shanta Variant soils do not have a petrocalcic horizon. Lozier soils have limestone bedrock at a depth of less than 20 inches.

Typical pedon of Espy loam in an area of Espy-Shanta Variant association, gently sloping, NW1/4NW1/4 sec. 5, T. 21 S., R. 16 E.:

A1—0 to 7 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; few very fine tubular pores; strongly calcareous; moderately alkaline; gradual smooth boundary.

B2—7 to 11 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; weak medium and fine subangular blocky structure; slightly hard, friable, sticky and plastic; common fine roots; common very fine tubular pores; strongly calcareous; moderately alkaline; clear smooth boundary.

C1ca—11 to 17 inches; very pale brown (10YR 7/3) silt loam, brown (10YR 5/3) moist; weak medium and fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine tubular pores; strongly calcareous; moderately alkaline; abrupt smooth boundary.

C2cam—17 to 22 inches; white (10YR 8/1) indurated caliche, very pale brown (10YR 8/3) moist; massive; extremely hard; strongly calcareous; moderately alkaline; abrupt smooth boundary.

C3ca—22 to 60 inches; white (10YR 8/2) extremely gravelly silt loam, pale brown (10YR 6/3) moist; massive; extremely hard, extremely firm; 75 percent gravel-sized carbonate fragments; strongly calcareous; moderately alkaline.

The A horizon has value of 4 or 5 dry and chroma of 2 or 3. It is loam or very fine sandy loam.

The B horizon has value of 4 or 5 dry and chroma of 2 or 3. It is clay loam or silt loam.

The C1ca horizon has value of 6 or 7 dry and 5 or 6 moist. It is silt loam or clay loam. The C2cam horizon is continuous in most pedons but is ruptured and fractured in some pedons. The C3ca horizon has value of 7 or 8 dry and 6 or 7 moist. It is 45 to 75 percent gravel.

Gabaldon series

The Gabaldon series consists of deep, well drained soils that formed in mixed alluvium. Gabaldon soils are on alluvial flood plains and valley bottoms. Slope is 0 to 3 percent. Mean annual precipitation is about 14 inches, and mean annual air temperature is about 56 degrees F.

Gabaldon soils are similar to and near Shanta soils. They are near Bluepoint, Holloman, Onite, and Ruidoso soils. Shanta soils have more than 15 percent fine sand or coarser particles in the control section. Bluepoint soils have a sandy control section. Onite and Ruidoso soils have an argillic horizon. Holloman soils are less than 20 inches thick over bedded gypsum.

Typical pedon of Gabaldon fine sandy loam in an area of Shanta-Gabaldon association, nearly level, about 7 miles east of Three Rivers, SE1/4NE1/4 sec. 23, T. 11 S., R. 9 E.:

A11—0 to 4 inches; brown (10YR 5/3) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common fine roots; common fine interstitial pores; slightly calcareous; mildly alkaline; clear smooth boundary.

A12—4 to 9 inches; brown (10YR 5/3) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak coarse, medium, and fine subangular blocky structure; soft, friable, sticky and plastic; common fine roots; common fine tubular pores; slightly calcareous; mildly alkaline; clear smooth boundary.

A13—9 to 20 inches; grayish brown (10YR 5/2) silt loam, very dark gray (10YR 3/1) moist; strong fine and very fine subangular blocky structure; slightly hard, friable, sticky and very plastic; common fine roots; common fine tubular pores; slightly calcareous; mildly alkaline; clear smooth boundary.

B2—20 to 35 inches; brown (10YR 5/3) silt loam, very dark grayish brown (10YR 3/2) moist; moderate medium and fine subangular blocky structure; soft, friable, sticky and plastic; few fine and medium roots; common fine tubular pores; slightly calcareous; mildly alkaline; clear smooth boundary.

C—35 to 60 inches; brown (10YR 5/3) silt loam, very dark grayish brown (10YR 3/2) moist; weak medium and fine subangular blocky structure; soft, friable, sticky and plastic; few fine and medium roots; few fine tubular pores; slightly calcareous; mildly alkaline.

The solum is 26 to 47 inches thick.

The A horizon is loam, loamy sand, fine sandy loam, or silt loam.

The B2 horizon has value of 4 or 5 dry. It is silt loam or clay loam.

The C horizon has value of 4 or 5 dry. It is silt loam, clay loam, sandy clay loam, or sandy loam.

Holloman series

The Holloman series consists of well drained soils that formed in gypsiferous sediment of eolian and alluvial origin. They are shallow over gypsum. Holloman soils are on nearly level to gently sloping uplands. Slope is 0 to 5 percent. The mean annual precipitation is about 8 inches, and the mean annual air temperature is about 60 degrees F.

Holloman soils are similar to and near Alamogordo and Yesum soils and are also near Reeves, Tome, and Crowflats soils. Alamogordo and Yesum soils are deep and have a gypsic horizon. Tome and Crowflats soils

have a fine-silty control section. Reeves soils are more than 20 inches deep over gypsiferous material and have a calcic horizon.

Typical pedon of Holloman very fine sandy loam, 0 to 1 percent slopes, about 4 miles east of intersection south of alkali lake, sec. 6, T. 26 S., R. 19 E.

A1—0 to 3 inches; very pale brown (10YR 7/3) very fine sandy loam, pale brown (10YR 6/3) moist; weak medium and coarse granular structure; soft, very friable, nonsticky and nonplastic; very few very fine and fine roots; common very fine and fine interstitial pores; strongly calcareous; moderately alkaline; clear smooth boundary.

C1cs—3 to 13 inches; very pale brown (10YR 7/3) very fine sandy loam, brown (10YR 5/3) moist; massive; soft, very friable, slightly sticky and nonplastic; very few fine and medium roots; common fine and very fine interstitial pores; strongly calcareous; moderately alkaline; clear smooth boundary.

C2cs—13 to 20 inches; very pale brown (10YR 8/3) gypsum, pale brown (10YR 6/3) moist; massive; soft, very friable, slightly sticky and nonplastic; very few fine and medium roots; few fine and common very fine interstitial pores; strongly calcareous; moderately alkaline; clear smooth boundary.

C3cs—20 to 60 inches; white (10YR 8/2) gypsum, pale brown (10YR 6/3) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; common fine and very fine interstitial pores; strongly calcareous; moderately alkaline.

The A horizon has hue of 10YR or 7.5YR, value of 6 or 7 dry and 5 or 6 moist, and chroma of 2 to 4 dry and moist.

The Ccs horizon has hue of 10YR or 7.5YR, value of 6 to 8 dry, and chroma of 2 to 4 dry and moist.

Holloman Variant

The Holloman Variant consists of shallow, well drained soils that formed in gypsiferous residuum and eolian material. These soils are on the lower part of side slopes of pediments, rock-controlled side slopes, and low rolling hills. Slope is 15 to 50 percent. Mean annual precipitation is about 15 inches, and the mean annual air temperature is about 51 degrees F.

Holloman Variant soils are similar to Holloman and Alamogordo soils and are similar to and near Deama and Lozier soils. Holloman soils have an ochric epipedon and are warmer. Alamogordo soils have a gypsic horizon. Deama soils have bedrock at a depth of less than 20 inches. Lozier soils are warmer and have bedrock at a depth of less than 20 inches.

Typical pedon of Holloman Variant gravelly loam in an area of Deama-Rock outcrop-Holloman Variant complex, 15 to 65 percent slopes, extreme southeast corner of sec. 3, T. 13 S., R. 11 E.

A1—0 to 12 inches; dark brown (10YR 4/3) gravelly loam, dark brown (10YR 3/3) moist; moderate fine and very fine granular structure in upper 1 inch, weak medium and coarse subangular blocky structure below; soft, friable, slightly sticky and slightly plastic; common fine and very fine roots; few very fine tubular pores; strongly calcareous; moderately alkaline; abrupt smooth boundary.

C1cs—12 to 20 inches; very pale brown (10YR 8/3) gypsum, pale brown (10YR 6/3) moist; massive; soft, very friable, slightly sticky and nonplastic; few fine and very fine roots; a few very hard indurated lenses of gypsum; strongly calcareous; moderately alkaline; abrupt wavy boundary.

IIC2—20 inches; olive gray (5YR 4/2) and olive brown (2.5YR 4/4) gypsiferous shale and sandstone; partially weathered; a few roots in the upper 8 inches; strongly calcareous; moderately alkaline.

The A horizon has hue of 10YR or 7.5YR, value of 4 or 5 dry, and chroma of 2 or 3. It is gravelly loam or gravelly fine sandy loam with 15 to 25 percent gravel.

The Ccs horizon has hue of 10YR or 7.5YR, value of 7 or 8 dry and 6 or 7 moist, and chroma of 2 or 3. Gravel content is less than 10 percent.

Jal series

The Jal series consists of deep, well drained soils that formed in strongly calcareous eolian material over lacustrine sediment. Jal soils are nearly level and slightly concave on relic playa lakes and lake benches. Slope is 0 to 2 percent. The mean annual precipitation is about 9 inches, and the mean annual air temperature is about 61 degrees F.

Jal soils are similar to Armesa and Wink soils and are near Tome, Mimbres, Reakor, Bluepoint, and Reyab soils. Armesa soils are more moist. Wink soils have mixed mineralogy. Reakor soils have a fine-silty control section and mixed mineralogy. Tome, Mimbres, Bluepoint, and Reyab soils do not have a calcic horizon.

Typical pedon of Jal silt loam in an area of Jal-Tome association, nearly level SE1/4SW1/4 sec. 7, T. 23 S. R. 15 E.

A11—0 to 4 inches; very pale brown (10YR 7/3) silt loam, brown (10YR 5/3) moist; moderate fine granular structure; soft, very friable, slightly sticky and slightly plastic; common fine and medium roots; common very fine tubular and common very fine interstitial pores; strongly calcareous; moderately alkaline; gradual smooth boundary.

A12—4 to 12 inches; very pale brown (10YR 7/3) silty loam, brown (10YR 5/3) moist; weak fine and

medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and medium roots; common very fine tubular and common very fine interstitial pores; strongly calcareous; moderately alkaline; gradual smooth boundary.

C1ca—12 to 26 inches; very pale brown (10YR 8/3) silt loam, pale brown (10YR 6/3) moist; weak medium and coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and medium roots; common very fine tubular pores; strongly calcareous; moderately alkaline; clear smooth boundary.

C2ca—26 to 60 inches; white (10YR 8/2) lacustrine sediment with texture of silt loam, very pale brown (10YR 7/3) moist; common fine prominent yellow mottles; weak medium and coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and medium roots; common very fine tubular pores; strongly calcareous; moderately alkaline.

The family control section is more than 40 percent carbonates.

The A horizon has value of 6 or 7 dry and chroma of 2 or 3.

The Cca horizon has value of 7 or 8 dry and 6 or 7 moist.

Jerag series

The Jerag series consists of well drained soils that formed in medium textured eolian and alluvial sediment. They are shallow over indurated caliche. Jerag soils are on broad slightly concave uplands. Slope is 0 to 3 percent. Mean annual precipitation is about 14 inches, and the mean annual air temperature is about 60 degrees F.

Jerag soils are similar to Philder and Tencee soils. They are near Armesa, Philder, Lozier, and Reyab soils. Armesa, Lozier, and Reyab soils do not have an argillic or petrocalcic horizon. Philder and Tencee soils do not have an argillic horizon and contain more than 35 percent coarse fragments.

Typical pedon of Jerag very fine sandy loam in an area of Jerag-Philder association, gently rolling, SW1/4NW1/4 sec. 14, T. 26 S., R. 11 E.:

A1—0 to 3 inches; brown (10YR 4/3) very fine sandy loam, dark brown (10YR 3/3) moist; weak fine and very fine subangular blocky structure parting to moderate fine granular; soft, very friable, slightly sticky and slightly plastic; common very fine and fine roots; few very fine tubular pores; mildly alkaline; abrupt smooth boundary.

B2t—3 to 9 inches; brown (7.5YR 4/4) sandy clay loam, dark brown (7.5YR 4/4) moist; moderate medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and plastic; common very fine and fine roots; common very fine tubular pores; few thin clay films on faces of peds and lining pores; mildly alkaline; abrupt smooth boundary.

B3ca—9 to 19 inches; yellowish brown (10YR 5/4) gravelly loam, brown (10YR 4/3) moist; weak very fine and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; common very fine tubular pores; 20 percent gravel and 5 percent cobbles of cemented calcium carbonate; exteriors of fragments are very pale brown (10YR 7/4) and the interiors are white (10YR 8/2); strongly calcareous; moderately alkaline; abrupt wavy boundary.

C1cam—19 to 25 inches; white (10YR 8/1) carbonate-cemented material, white (10YR 8/2) moist; massive; extremely hard; carbonate laminae occur discontinuously in upper part; strongly calcareous; moderately alkaline; abrupt wavy boundary.

C2ca—25 to 60 inches; white (10YR 8/2) gravelly silt loam, pale brown (10YR 6/3) moist; massive; hard, firm, slightly sticky and slightly plastic; 30 percent very hard and extremely hard strongly cemented angular calcium carbonate fragments; strongly calcareous; moderately alkaline.

The solum ranges from 14 to 20 inches in thickness. The A1 and B2t horizons most often lack fine carbonates, but some pedons have segregated lime in the form of soft masses and concretions.

The A1 horizon is brown, dark brown, or dark yellowish brown very fine sandy loam or loam.

The B2t horizon is brown, dark brown, yellowish brown, or dark yellowish brown loam, clay loam, or sandy clay loam. It has weak or moderate structure. The B3ca horizon is brown, pale brown, very pale brown, yellowish brown, or light yellowish brown gravelly silt loam or gravelly loam. It has very fine, fine, or medium subangular blocky structure or is massive. Gravel ranges from 25 to 35 percent.

The Ccam horizon is continuously indurated except for scattered cracks and pockets and ranges from 4 to 8 inches in thickness.

Kerrick series

The Kerrick series consists of well drained soils that formed in mixed alluvium. They are moderately deep over indurated caliche. They are in upland valleys. Slope is 0 to 2 percent. The mean annual precipitation is about 15 inches, and the mean annual air temperature is 55 degrees F.

Kerrick soils are similar to and near Pena soils. They are near Deama, Ector, and Cale soils. Deama and Ector soils have limestone bedrock at a depth of 20 inches or less. Pena soils contain 35 percent or more gravel in the control section and do not have a petrocalcic horizon.

Cale soils have an argillic horizon and are less than 15 percent fine sand or coarser particles in the control section.

Typical pedon of Kerrick silt loam in an area of Pena-Cale-Kerrick association, nearly level, about 0.4 mile east of Pinon, SW1/4 sec. 27, T. 19 S., R. 15 E.:

A1—0 to 9 inches; brown (10YR 5/3) silt loam, dark brown (10YR 3/3) moist; weak medium and fine subangular blocky structure; soft, friable, sticky and plastic; common medium and fine roots; few medium and fine tubular pores; moderately calcareous; moderately alkaline; gradual smooth boundary.

B2—9 to 17 inches; brown (10YR 5/3) silt loam, dark brown (10YR 3/3) moist; weak medium and fine subangular blocky structure; slightly hard, friable, sticky and plastic; common medium and fine roots; few medium and fine tubular pores; moderately calcareous; moderately alkaline; gradual smooth boundary.

B3ca—17 to 25 inches; pale brown (10YR 6/3) clay loam, dark yellowish brown (10YR 3/4) moist; weak fine angular blocky structure; hard, friable, sticky and plastic; common medium and fine roots; common fine tubular pores; moderately calcareous; moderately alkaline; gradual smooth boundary.

Ccam—25 to 60 inches; indurated caliche.

Depth to the petrocalcic horizon is 22 to 30 inches.

The A horizon has value of 4 or 5 dry and chroma of 2 or 3. It is silt loam or heavy loam.

The B2 horizon has value of 4 or 5 dry and chroma of 2 or 3. It is silt loam, silty clay loam, or clay loam. The B3ca horizon has value of 5 or 6 dry and 3 or 4 moist and chroma of 3 or 4.

La Fonda series

The La Fonda series consists of deep, well drained soils that formed in mixed alluvium. They are on alluvial fans. Slope is 0 to 5 percent. Mean annual precipitation is about 14 inches, and the mean annual air temperature is about 56 degrees F.

La Fonda soils are similar to Pena Variant and Prelo soils. They are near Bluepoint, Onite, Gabaldon, and Shanta soils. Pena Variant soils have a skeletal control section. Prelo soils are less than 15 percent fine sand or coarser particles and have a mean annual soil temperature between 59 and 72 degrees F. Bluepoint soils are sandy throughout. Onite soils have an argillic horizon. Gabaldon soils are less than 15 percent fine sand or coarser particles and 18 to 35 percent clay. Shanta soils have a mollic epipedon.

Typical pedon of La Fonda loam in an area of La Fonda association, gently sloping, SE1/4SE1/4 sec. 8, T. 11 S., R. 9 1/2 E.:

A1—0 to 2 inches; brown (7.5YR 5/4) loam, dark brown (7.5YR 3/3) moist; common fine and very fine granular structure; soft, very friable, sticky and plastic; few fine and very fine roots; few fine tubular pores; slightly calcareous; mildly alkaline; abrupt smooth boundary.

B21—2 to 14 inches; brown (7.5YR 5/4) silt loam, dark brown (7.5YR 3/3) moist; weak medium prismatic structure parting to moderate medium and fine subangular blocky; soft, friable, sticky and plastic; common fine and medium roots; common fine tubular pores; strongly calcareous; moderately alkaline; gradual smooth boundary.

B22ca—14 to 20 inches; brown (7.5YR 5/4) silt loam, dark brown (7.5YR 4/4) moist; moderate medium and fine subangular blocky structure; soft, friable, sticky and plastic; few fine and very fine roots; common fine tubular pores; strongly calcareous, few small filaments of lime; moderately alkaline; clear smooth boundary.

B23ca—20 to 26 inches; brown (7.5YR 5/4) silt loam, dark brown (7.5YR 3/4) moist; moderate medium and fine subangular blocky structure; slightly hard, friable, sticky and plastic; few fine and very fine roots; common fine tubular pores; strongly calcareous, few nodules of lime; moderately alkaline; clear smooth boundary.

Cca—26 to 60 inches; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4) moist; massive; slightly hard, friable, sticky and plastic; very few fine and very fine roots; few fine tubular pores; strongly calcareous, common fine and very fine filaments of lime; moderately alkaline.

The A horizon has value of 5 or 6 dry and 3 or 4 moist and chroma of 3 or 4. It is loam or very fine sandy loam.

The B horizon has value of 5 or 6 dry and 3 or 4 moist and chroma of 3 or 4. It is loam, silt loam, or clay loam.

The C horizon has value of 5 or 6 dry and 4 or 5 moist. It is clay loam, loam, or silt loam.

Largo series

The Largo series consists of deep, well drained soils that formed in medium textured alluvium from Triassic red bed material. They are on lower parts of side slopes of pediments and on basin floors. Slope is 0 to 5 percent. Mean annual precipitation is about 9 inches, and the mean annual air temperature is about 61 degrees F.

Largo soils are similar to and near Prelo and Tome soils. They are also near Aztec, Alamogordo, Holloman, McCullough, and Ogral soils. Prelo soils have a cambic horizon. Tome soils have hue of 10YR. Aztec soils have a gypsic horizon and more than 35 percent gravel in the control section. Alamogordo soils have a gypsic horizon. Holloman soils are 20 inches or less thick over bedded gypsum. McCullough soils are less than 18 percent clay

and 15 percent or more fine or coarser sand in the control section. Ogral soils have a loamy-skeletal control section.

Typical pedon of Largo silt loam, 0 to 1 percent slopes, at La Luz, NW1/4NE1/4 sec. 35, T. 15 S., R. 10 E:

A1—0 to 4 inches; reddish brown (5YR 4/4) silt loam, dark reddish brown (5YR 3/3) moist; moderate very thin and thin platy structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine vesicular pores; strongly calcareous; moderately alkaline; abrupt smooth boundary.

AC—4 to 21 inches; reddish brown (5YR 5/3) silty clay loam, dark reddish brown (5YR 3/4) moist; moderate fine and medium subangular blocky structure; hard, very friable, sticky and plastic; common very fine, fine, and medium and few coarse roots; common fine and very fine vesicular pores; strongly calcareous; moderately alkaline; abrupt smooth boundary.

C1—21 to 49 inches; light reddish brown (5YR 6/3) silty clay loam, dark reddish brown (5YR 3/4) moist; massive; hard, friable, sticky and plastic; common very fine, fine, and medium and few coarse roots; common fine and very fine vesicular pores; strongly calcareous; moderately alkaline; abrupt smooth boundary.

C2—49 to 84 inches; reddish brown (5YR 5/4) silty clay loam, dark reddish brown (5YR 3/4) moist; massive; hard, friable, sticky and plastic; common very fine, fine, and medium and few coarse roots; common very fine and fine vesicular pores; strongly calcareous; moderately alkaline.

The A horizon has hue of 10YR, 7.5YR, or 5YR; value of 4 to 6 dry and 3 or 4 moist; and chroma of 3 or 4. It is silt loam, very fine sandy loam, or sandy loam. This horizon has weak, moderate, or strong very thin, thin, or medium platy structure or weak, moderate, or strong very fine, fine, or medium granular structure.

The AC horizon has value of 3 or 4 moist and chroma of 2 to 4. It is silty clay loam, silt loam, or loam. It has weak or moderate structure.

The C horizon has hue of 2.5YR to 7.5YR, value of 5 or 6 dry and 3 or 4 moist, and chroma of 3 or 4 dry and moist. It is silty clay loam, silt loam, or loam. This horizon is normally massive, but some pedons have weak fine and medium subangular blocky structure in the upper 10 inches. Some pedons have small amounts of gypsum in the lower part of the C horizon in the form of soft masses of small crystals. The C2 horizon is as much as 10 percent gravel in some pedons. In some pedons hue of 2.5YR is common below a depth of 60 inches.

Lozier series

The Lozier series consists of shallow, well drained soils that formed in material weathered from limestone. These soils are on hillsides, ridgetops, benches, and escarpment caps. Slope is 0 to 50 percent. The mean annual precipitation is about 9 inches, and the mean annual temperature is about 61 degrees F.

Lozier soils are similar to Ector, Deama, and Tencee soils and are near Reakor, Tome, Bluepoint, Nickel, and Tencee soils. Ector and Deama soils have a mollic epipedon, and Deama soils are cooler. Tencee soils have a petrocalcic horizon. Reakor and Tome soils have a fine-silty control section. Bluepoint soils have a sandy control section. Nickel soils have mixed mineralogy and no lithic contact.

Typical pedon of Lozier very gravelly loam in an area of Rock outcrop-Lozier complex, 20 to 65 percent slopes, on the side of a limestone hill, 300 feet north of County Road 506, 3/4 of a mile east of where road crosses west boundary of section 3, NE1/4SE1/4 sec. 3, T. 23 S., R. 16 E.:

A11—0 to 1 inch; light gray (10YR 7/2) very gravelly silt loam, brown (10YR 5/3) moist; weak thin platy structure; soft, very friable, nonsticky and nonplastic; common very fine roots; common very fine tubular pores; 40 percent limestone gravel and 2 percent limestone cobbles; strongly calcareous; moderately alkaline; clear wavy boundary.

A12—1 inch to 7 inches; light brownish gray (10YR 6/2) very gravelly loam, brown (10YR 5/3) moist; weak fine and medium subangular blocky and very fine granular structure; soft, friable, slightly sticky and slightly plastic; 45 percent limestone gravel and 5 percent limestone cobbles; strongly calcareous; moderately alkaline; clear wavy boundary.

Cca—7 to 15 inches; white (10YR 8/2) extremely gravelly silty clay loam, very pale brown (10YR 7/3) moist; massive; hard, friable, slightly sticky and slightly plastic; common very fine roots; common very fine tubular pores; 70 percent limestone gravel and 5 percent limestone cobbles; strongly calcareous; moderately alkaline; abrupt wavy boundary.

R—15 inches; limestone bedrock; surface is fractured in some places but fractures are not continuous.

The A horizon ranges from 6 to 18 inches in thickness. It rests directly on limestone bedrock in some pedons. Coarse fragments make up 35 to 55 percent of the upper part of the profile and 45 to 80 percent of the lower part.

The A horizon has hue of 10YR or 7.5YR, value of 5 to 7 dry and 4 or 5 moist, and chroma of 2 to 4. It is gravelly loam, very gravelly loam, or very gravelly fine sandy loam. In some pedons, the upper part of the A horizon is very gravelly silt loam.

The Cca horizon has hue of 10YR or 7.5YR and value of 6 to 8 dry. It is very gravelly silty clay loam, very gravelly loam, or very gravelly silt loam.

McCullough series

The McCullough series consists of deep, well drained soils that formed in mixed alluvium. They are on foot slopes of pediments. Slope is 0 to 3 percent. Mean annual precipitation is about 10 inches, and the mean annual air temperature is about 61 degrees F.

McCullough soils are similar to Bluepoint, McCullough Variant, Pintura, Onite, Tobler, and Wink soils. They are near Alamogordo, Holloman, Largo, and Prelo soils. Bluepoint and Pintura soils have a sandy control section. McCullough Variant soils have a fine-loamy control section. Onite soils have an argillic horizon. Tobler soils are highly stratified and are flooded frequently. Wink soils have a calcic horizon. Largo and Prelo soils are more than 18 percent clay and less than 15 percent fine sand or coarser particles. Holloman soils have a solum less than 20 inches thick over bedded gypsum. Alamogordo soils have a gypsic horizon.

Typical pedon of McCullough sandy loam, 1 to 3 percent slopes, SE1/4 sec. 16, T. 15 S., R. 10 E.:

A1—0 to 5 inches; reddish brown (5YR 5/4) sandy loam, dark reddish brown (5YR 3/4) moist; weak medium platy and weak medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common fine and very fine roots; common very fine vesicular pores; strongly calcareous; moderately alkaline; gradual smooth boundary.

AC—5 to 22 inches; reddish brown (5YR 5/4) fine sandy loam, dark reddish brown (5YR 3/4) moist; weak medium and fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common fine and very fine roots; common fine tubular pores; strongly calcareous; moderately alkaline; abrupt irregular boundary.

C1—22 to 29 inches; reddish brown (5YR 5/4) very gravelly coarse sand, dark reddish brown (5YR 3/4) moist; single grain; loose, nonsticky and nonplastic; few fine and very fine roots; common fine interstitial pores; strongly calcareous; moderately alkaline; abrupt irregular boundary.

C2—29 to 60 inches; reddish brown (5YR 5/4) fine sandy loam, dark reddish brown (5YR 3/4) moist; weak coarse, medium, and fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; few fine and very fine roots; common fine tubular pores; common small soft masses of gypsum; strongly calcareous; moderately alkaline.

The A horizon has hue of 5YR or 7.5YR, value of 3 or 4 moist, and chroma of 3 or 4. It is fine sandy loam, sandy loam, or very fine sandy loam. In some pedons desert pavement covers part of the surface.

The AC horizon has hue of 5YR or 7.5YR. It is fine sandy loam, very fine sandy loam, or loam. In some pedons this horizon is sandy clay loam with less than 23 percent clay.

The C horizon has hue of 5YR or 7.5YR and chroma of 3 or 4. The upper part of the C horizon generally is very gravelly coarse sand, very gravelly sandy loam, gravelly sandy loam, or gravelly fine sandy loam, but some pedons do not contain any gravel. The lower part of the C horizon is fine sandy loam, loam, or sandy loam; a few thin strata of silt loam are present in some pedons. This horizon contains masses, filaments, or some pendants of gypsum underneath the pebbles.

McCullough Variant

The McCullough Variant consists of deep, well drained soils that formed in mixed alluvium. These soils are on lower parts of toe slopes of pediments and the upper parts of the basin floor. Slope is 0 to 1 percent. Mean annual precipitation is 10 inches, and the mean annual air temperature is about 61 degrees F.

McCullough Variant soils are similar to McCullough, Largo, Prelo, Reeves, and Tobler soils. They are near Largo, Prelo, McCullough, and Alamogordo soils and Torrifluvents. McCullough soils are less than 18 percent clay. Largo and Prelo soils are less than 15 percent fine sand or coarser particles. Reeves soils have a gypsic horizon. Tobler soils are highly stratified and are less than 18 percent clay. Torrifluvents have irregular decrease in organic matter. Alamogordo soils have a gypsic horizon and are less than 18 percent clay.

Typical pedon of McCullough Variant very fine sandy loam, 0 to 1 percent slopes, SW1/4NW1/4 sec. 29, T. 15 S., R. 10 E.:

A1—0 to 7 inches; light brown (7.5YR 6/4) very fine sandy loam, dark reddish brown (5YR 3/4) moist; moderate thin and medium platy structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; common very fine tubular pores; strongly calcareous, lime segregated as few fine soft masses and threads; moderately alkaline; clear smooth boundary.

AC—7 to 15 inches; light brown (7.5YR 6/4) loam, dark reddish brown (5YR 3/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; common very fine tubular pores; strongly calcareous, lime segregated as few fine soft masses; moderately alkaline; gradual smooth boundary.

C1—15 to 32 inches; light brown (7.5YR 6/4) very fine sandy loam, dark reddish brown (5YR 3/4) moist; weak fine and medium subangular blocky structure;

slightly hard, friable, slightly sticky and slightly plastic; very few very fine roots; common very fine tubular pores; strongly calcareous, lime segregated as fine soft masses; moderately alkaline; clear smooth boundary.

C2—32 to 60 inches; reddish brown (5YR 5/4) silt loam, dark reddish brown (5YR 3/4) moist; moderate fine and medium subangular blocky structure; hard, firm, sticky and plastic; very few very fine roots; many very fine and fine tubular pores; few fine soft masses of gypsum; strongly calcareous, lime segregated in fine soft masses; moderately alkaline.

The A horizon has hue of 5YR or 7.5YR, value of 5 or 6 dry and 3 or 4 moist, and chroma of 3 or 4. It is generally very fine sandy loam or loam but is fine sandy loam or silt loam in some pedons.

The AC horizon has hue of 5YR or 7.5YR, value of 5 or 6 dry and 3 or 4 moist, and chroma of 3 or 4. It is loam, very fine sandy loam, or fine sandy loam.

The C horizon has hue of 5YR or 7.5YR, value of 3 or 4 moist, and chroma of 3 or 4. The upper part is quite variable in texture but is dominantly very fine sandy loam or loam and has very thin strata in some pedons. The lower part is silt loam, silty clay loam, or clay loam. In some pedons the lower part has small amounts of gypsum in the form of soft masses and fine crystals. The C horizon is 18 to 30 percent clay.

Mead series

The Mead series consists of deep, poorly drained soils that formed in fine textured alluvial deposits with some deposits of eolian material. They are on alluvial flood plains. Slope is 0 to 1 percent. Mean annual precipitation is about 8 inches, and the mean annual air temperature is about 61 degrees F.

Mead soils are similar to and near Alamogordo soils. They are near Holloman and Yesum soils. Alamogordo and Yesum soils have a gypsic horizon. Holloman soils have a solum less than 20 inches thick over bedded gypsum.

Typical pedon of Mead silty clay loam, 0 to 1 percent slopes, NE1/4 sec. 24, T. 19 S., R. 8 E.:

A11—0 to 3 inches; reddish brown (2.5YR 5/4) silty clay loam, reddish brown (2.5YR 4/4) moist; weak medium platy structure; hard, friable, sticky and plastic; common fine vesicular and common very fine interstitial pores; many fine prominent crystals of gypsum; moderately calcareous; moderately alkaline; abrupt smooth boundary.

A12sacs—3 to 5 inches; reddish brown (2.5YR 5/4) clay loam, reddish brown (2.5YR 4/4) moist; moderate thin and medium platy structure; very hard, firm, sticky and plastic; few fine vesicular pores and common very fine interstitial pores; 25 percent fine prominent gypsum crystals; moderately calcareous; strongly alkaline; clear smooth boundary.

C1sacs—5 to 48 inches; light reddish brown (5YR 6/4) clay, reddish brown (5YR 4/4) moist; massive; very hard, firm, very sticky and plastic; about 30 percent fine prominent gypsum crystals; moderately calcareous; moderately alkaline; abrupt smooth boundary.

IIC2sacs—48 to 60 inches; lacustrine material.

A horizon that contains salts more soluble than gypsum is in the A horizon or the C horizon.

The A horizon has hue of 2.5YR or 5YR, value of 5 to 7 dry and 4 or 5 moist, and chroma of 2 to 4. It is silty clay loam, silty clay, or clay loam.

The C horizon has hue of 2.5YR or 5YR, value of 5 or 6 dry and 4 or 5 moist, and chroma of 2 to 4. It is silty clay loam, silty clay, clay loam, or clay. The IIC horizon is stratified beds of lacustrine material.

Mimbres series

The Mimbres series consists of deep, well drained soils that formed in silty calcareous alluvial sediment weathered from limestone. They are on broad flood plains on the lower parts of long, gently sloping alluvial fans terminating on valley floors. Slope is 0 to 3 percent. The mean annual precipitation is about 9 inches, and the mean annual air temperature is about 61 degrees F.

Mimbres soils are similar to and near Prelo, Tome, Largo, and Reakor soils and are near Reeves, Bluepoint, Jal, and Holloman soils. Prelo soils have gypsum in the C horizon. Tome and Largo soils do not have a cambic horizon. Reakor, Reeves, and Jal soils have a calcic horizon. Bluepoint soils have a sandy control section and do not have a cambic horizon. Holloman soils overlie bedded gypsum at a depth of less than 20 inches.

Typical pedon of Mimbres silt loam in an area of Mimbres-Tome association, nearly level, northeast corner of NW1/4SW1/4 sec. 35, T. 18 S., R. 9 E.:

A1—0 to 6 inches; pale brown (10YR 6/3) silt loam, dark brown (10YR 4/3) moist; moderate thick platy structure in upper 1/2 inch, moderate very fine and fine subangular blocky structure below; slightly hard, very friable, slightly sticky and nonplastic; common fine roots; common very fine and fine vesicular pores; strongly calcareous; moderately alkaline; clear smooth boundary.

B21—6 to 13 inches; pale brown (10YR 6/3) silty clay loam, dark brown (10YR 4/3) moist; moderate medium and fine subangular blocky structure; common fine and very fine roots; common very fine, fine, and medium vesicular pores; strongly calcareous; moderately alkaline; gradual smooth boundary.

B22—13 to 25 inches; brown (10YR 5/3) silty clay loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; hard, friable, sticky and

plastic; few very fine roots; many very fine vesicular pores; strongly calcareous, lime along face of some peds and as threads in pores and old root channels; moderately alkaline; gradual smooth boundary.

C1ca—25 to 42 inches; pale brown (10YR 6/3) silty clay loam, brown (10YR 5/3) moist; weak very fine and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; many very fine vesicular pores; strongly calcareous, lime as threads and soft masses; moderately alkaline; gradual smooth boundary.

C2ca—42 to 60 inches; brown (10YR 5/3) silty clay loam, brown (10YR 5/3) moist; massive; slightly hard, firm, sticky and slightly plastic; common very fine vesicular pores; strongly calcareous; moderately alkaline.

The solum ranges from 22 to 30 inches in thickness. The cambic horizon ranges from 19 to 24 inches in thickness.

The A horizon has hue of 10YR or 7.5YR, value of 5 or 6 dry and 4 or 5 moist, and chroma of 2 to 4. It is silt loam, very fine sandy loam, or silty clay loam.

The B2 horizon has hue of 10YR or 7.5YR, value of 4 to 6 dry and 4 or 5 moist, and chroma of 2 to 4. It is silty clay loam, silt loam, or clay loam.

The Cca horizon has hue of 10YR or 7.5YR, value of 5 to 7 dry and 4 or 5 moist, and chroma of 3 or 4. It ranges from heavy silt loam to silty clay loam.

Some pedons mapped as Mimbres soils have hue of 5YR in the lower part of the B horizon and in the C horizon, which is outside the range defined for the Mimbres series, but this difference does not affect the use and behavior of the soils.

Montecito series

The Montecito series consists of deep, well drained soils that formed in mixed alluvium and eolian material. They are on level to moderately sloping alluvial fans, sides of pediments, and plains. Mean annual precipitation is about 14 inches, and the mean annual air temperature is about 52 degrees F.

Montecito soils are similar to Ruidoso soils and are near Tortugas, Dye, and Encierro soils. Ruidoso soils have a mollic epipedon. Tortugas, Dye, and Encierro soils are shallow over bedrock.

Typical pedon of Montecito loam, 0 to 10 percent slopes, SE1/4SE1/4 sec. 31, T. 24 S., R. 20 E.:

A1—0 to 3 inches; yellowish brown (10YR 5/4) loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium subangular blocky structure; soft, friable, slightly sticky and slightly plastic; many very fine roots; common very fine tubular pores; mildly alkaline; clear smooth boundary.

B21t—3 to 17 inches; brown (10YR 4/3) clay loam, dark yellowish brown (10YR 3/4) moist; moderate medium prismatic structure; hard, firm, very sticky and very plastic; common very fine roots; few very fine tubular pores; many thin clay films on faces of peds and lining pores; neutral; clear wavy boundary.

B22t—17 to 29 inches; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 3/4) moist; moderate medium subangular blocky structure; hard, firm, very sticky and very plastic; common very fine roots; few very fine tubular pores; very few very fine clay films on faces of peds and lining pores; neutral; abrupt wavy boundary.

B23tca—29 to 50 inches; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 3/4) moist; moderate medium subangular blocky structure; very hard, very firm, sticky and plastic; common very fine roots; few very fine tubular pores; very few very fine clay films on faces of peds and lining pores; strongly calcareous, common fine threads of lime; moderately alkaline; abrupt wavy boundary.

B3ca—50 to 60 inches; brown (7.5YR 5/4) clay loam, strong brown (7.5YR 4/6) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; few very fine roots; few very fine tubular pores; very few very thin clay films on faces of peds and lining pores; strongly calcareous, common fine to medium soft masses and threads of lime; moderately alkaline; clear wavy boundary.

Cca—60 to 62 inches; pinkish white (7.5YR 8/2) clay loam, very pale brown (10YR 7/4) moist; massive; very hard, very firm, slightly sticky and slightly plastic; strongly calcareous, disseminated lime and common lime concretions; moderately alkaline.

The solum ranges from 30 to 60 inches in thickness. Coarse fragments make up 0 to 15 percent of the solum. Reaction ranges from mildly alkaline to moderately alkaline.

The A1 horizon has value of 4 to 6 dry and 3 or 4 moist and chroma of 2 to 4. It is loam or clay loam.

The B2t horizon has value of 4 to 6 dry and 3 or 4 moist and chroma of 3 or 4. It is heavy clay loam or clay.

The C horizon has hue of 7.5YR or 10YR, value of 7 or 8 dry and 5 to 8 moist, and chroma of 1 to 4. It is clay loam, sandy clay loam, or fine sandy loam.

Nickel series

The Nickel series consists of deep, well drained soils that formed in very gravelly alluvium mainly from limestone. They are on middle and upper parts of side slopes of pediments and on alluvial fans. Slope is 1 to 30 percent. The mean annual precipitation is about 9 inches, and the mean annual air temperature is about 63 degrees F.

Nickel soils are similar to Aztec, Emot, Ogral, and Lozier soils and are near Tencee, Lozier, Aztec, Reakor, and Ogral soils. Aztec soils have a gypsic horizon. Emot and Ogral soils do not have a calcic horizon. Lozier soils have lithic contact at a depth of less than 20 inches. Tencee soils have a petrocalcic horizon. Reakor soils have a fine-silty control section.

Typical pedon of Nickel gravelly fine sandy loam in an area of Nickel-Tencee association, strongly sloping, 1/2 mile north of Johnson Tanks on trail in the southwest corner of sec. 8, T. 22 S., R. 18 E.:

A1—0 to 5 inches; very pale brown (10YR 7/3) gravelly very fine sandy loam, brown (10YR 5/3) moist; weak medium and thick platy and weak coarse granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; common fine interstitial pores; 20 percent gravel; strongly calcareous, lime disseminated; moderately alkaline; clear wavy boundary.

C1—5 to 17 inches; pale brown (10YR 6/3) gravelly fine sandy loam, brown (10YR 4/3) moist; weak coarse granular structure; slightly hard, very friable, nonsticky and nonplastic; few medium and common coarse roots; common fine interstitial pores; 25 percent gravel; strongly calcareous, lime disseminated, and in soft masses; moderately alkaline; clear wavy boundary.

C2ca—17 to 28 inches; white (10YR 8/2) very gravelly sandy loam, light gray (10YR 7/2) moist; massive; slightly hard, friable, slightly sticky and nonplastic; few medium and common coarse roots; common fine interstitial pores; 50 percent gravel; strongly calcareous, lime disseminated and in many soft masses, thick coatings of lime on underside of gravel; moderately alkaline; gradual wavy boundary.

C3—28 to 60 inches; very pale brown (10YR 7/3) very gravelly sandy loam, brown (10YR 5/3) moist; massive; soft, friable, nonsticky and nonplastic; few medium and common coarse roots; common fine interstitial pores; 75 percent gravel; strongly calcareous; moderately alkaline.

The control section is 35 to 80 percent coarse fragments. Cobbles and/or stones make up 0 to 5 percent of each horizon.

The A horizon has hue of 7.5YR and 10YR, value of 6 or 7 dry and 5 or 6 moist, and chroma of 2 to 4. The texture is gravelly very fine sandy loam, gravelly fine sandy loam, very gravelly loam, or gravelly sandy loam.

The C1 horizon has hue of 10YR or 7.5YR, value of 6 or 7 dry and 4 to 6 moist, and chroma of 2 or 3. Texture is very gravelly sandy loam or gravelly fine sandy loam. The Cca horizon has hue of 7.5YR or 10YR, value of 7 or 8 dry, and chroma of 2 or 3. It is very gravelly sandy loam or very gravelly fine sandy loam with 15 to 25 percent calcium carbonate equivalent.

Some pedons mapped as Nickel soils lack a calcic horizon. This is outside the range defined for the Nickel series, but the difference does not affect the use and behavior of the soils.

Ogral series

The Ogral series consists of deep, well drained soils that formed in mixed alluvium. Ogral soils are on the lower part of foot slopes of pediments. Slope is 0 to 5 percent. Mean annual precipitation is about 9 inches, and the mean annual air temperature is about 61 degrees F.

Ogral soils are similar to Aztec, Emot, Largo, and Nickel soils. They are near the Alamogordo, Aztec, Largo, Prelo, Tome, and McCullough soils. Aztec soils have a gypsic horizon. Emot soils are finer than gravelly fine sandy loam and have hue of 7.5YR or 10YR. Largo soils have a fine-silty control section. Nickel soils have a calcic horizon. Alamogordo soils have a gypsic horizon. Alamogordo, Prelo, Tome, and McCullough soils do not have a skeletal control section.

Typical pedon of Ogral very fine sandy loam in an area of Largo-Ogral complex, 1 to 3 percent slopes, NW1/4SE1/4 sec. 5, T. 15 S., R. 10 E.:

A1—0 to 2 inches; reddish brown (5YR 5/4) very fine sandy loam, dark reddish brown (5YR 3/3) moist; weak very thin platy structure; slightly hard, very friable, slightly sticky and slightly plastic; very few very fine and fine roots; common fine vesicular pores; strongly calcareous; moderately alkaline; abrupt smooth boundary.

AC—2 to 6 inches; reddish brown (5YR 5/4) very fine sandy loam, dark reddish brown (5YR 3/3) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; very few very fine and fine roots; common fine tubular pores; strongly calcareous; moderately alkaline; abrupt smooth boundary.

C1—6 to 18 inches; reddish brown (5YR 5/4) fine sandy loam, dark reddish brown (5YR 3/3) moist; massive; hard, very friable, nonsticky and nonplastic; very few very fine and fine roots; common fine tubular pores; 5 percent gravel; strongly calcareous; moderately alkaline; abrupt smooth boundary.

C2—18 to 60 inches; reddish brown (5YR 5/4) very gravelly fine sandy loam, dark reddish brown (5YR 3/3) moist; massive; hard, very friable, nonsticky and nonplastic; very few fine roots; common fine tubular pores; 50 percent gravel; strongly calcareous; moderately alkaline.

In places a desert pavement covers 30 to 60 percent of the surface. Depth to the very gravelly layer is 16 inches or more. Some pedons have small amounts of gypsum as small filaments or threads and small crystals.

The A horizon has value of 4 or 5 dry and 3 or 4 moist. It is commonly very fine sandy loam but in some pedons is fine sandy loam.

The AC horizon has value of 4 or 5 dry. It is very fine sandy loam, fine sandy loam, or sandy loam.

The C1 horizon has value of 4 or 5 dry. It is fine sandy loam or sandy loam and is 0 to 10 percent gravel. The C2 horizon has hue of 5YR or 7.5YR and value of 4 to 6 dry and 3 or 4 moist. It is very gravelly fine sandy loam or very gravelly sandy loam and is 40 to 70 percent gravel.

Onite series

The Onite series consists of deep, well drained soils that formed in mixed alluvium. They are on broad alluvial fans. Slope is 0 to 5 percent. Mean annual precipitation is about 9 inches, and the mean annual air temperature is about 63 degrees F.

Onite soils are similar to Berino and Dona Ana soils. They are near Berino, Holloman, Bluepoint, Pintura, and Wink soils. Berino and Dona Ana soils have a fine-loamy control section. Holloman soils are 20 inches or less deep over bedded gypsum. Bluepoint and Pintura soils do not have an argillic horizon and do have a sandy control section. Wink soils do not have an argillic horizon and do have a calcic horizon.

Typical pedon of Onite loamy fine sand in an area of Onite-Pintura association, gently sloping, NE1/4 sec. 2, T. 11 S., R. 9 E.:

A1—0 to 10 inches; brown (7.5YR 5/4) loamy fine sand, dark brown (7.5YR 4/4) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; very few very fine roots; common fine interstitial pores; mildly alkaline; abrupt smooth boundary.

B21t—10 to 16 inches; brown (7.5YR 5/4) sandy loam, dark brown (7.5YR 4/4) moist; moderate fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; very few fine and very fine roots; common fine tubular pores; sand grains have clay bridging; strongly calcareous; mildly alkaline; abrupt smooth boundary.

B22t—16 to 30 inches; brown (7.5YR 5/4) sandy loam, dark brown (7.5YR 4/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; very few very fine and fine roots; common fine tubular pores; sand grains have clay bridging; strongly calcareous; moderately alkaline; clear smooth boundary.

C1—30 to 38 inches; brown (7.5YR 5/4) sandy loam, dark brown (7.5YR 4/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; very few very fine and fine roots; common fine tubular pores; strongly calcareous; moderately alkaline; clear smooth boundary.

C2ca—38 to 60 inches; light brown (7.5YR 6/4) sandy loam, dark brown (7.5YR 4/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; very few fine and medium roots; common fine tubular pores; strongly calcareous; moderately alkaline.

The A1 horizon has hue of 5YR, 7.5YR, or 10YR; value of 3 or 4 moist; and chroma of 3 or 4.

The B2t horizon has hue of 5YR or 7.5YR, value of 5 dry, and chroma of 3 or 4. It is sandy loam or fine sandy loam and has moderate or weak fine, medium, and coarse subangular blocky structure.

The C horizon has hue of 5YR or 7.5YR, value of 5 to 7 dry and 4 to 6 moist, and chroma of 3 or 4. It is sandy loam, fine sandy loam, or loamy fine sand. It contains 0 to 5 percent gravel.

Pena series

The Pena series consists of deep, well drained soils that formed in mixed alluvium. Pena soils are in broad, dissected upland valleys. Slope is 0 to 10 percent. Mean annual precipitation is about 15 inches, and the mean annual air temperature is about 55 degrees F.

Pena soils are similar to Kerrick, Cale, Gabaldon, Shanta, and Ruidoso soils. They are near Aztec Variant, Kerrick, Cale, Ector, and Deama soils. Aztec Variant soils have a gypsic horizon. Kerrick soils have a petrocalcic horizon below a depth of 20 inches and contain less than 35 percent gravel. Cale, Shanta, Gabaldon, and Ruidoso soils do not have a calcic horizon and contain less than 35 percent gravel. Ector and Deama soils have limestone bedrock at a depth of less than 20 inches.

Typical pedon of Pena silty clay loam in an area of Pena-Cale-Kerrick association, nearly level, sec. 5, T. 20 S., R. 15 E.:

A1—0 to 9 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium granular and weak fine subangular blocky structure; slightly hard, friable, slightly sticky and plastic; common fine and very fine roots; common very fine tubular pores; 5 percent gravel; strongly calcareous; moderately alkaline; gradual smooth boundary.

ACca—9 to 14 inches; brown (10YR 5/3) gravelly clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium granular structure; slightly hard, friable, sticky and plastic; common very fine and fine roots; common very fine tubular pores; 15 percent limestone gravel with calcium carbonate coats; strongly calcareous; moderately alkaline; abrupt wavy boundary.

Cca—14 to 60 inches; white (10YR 8/2) very gravelly silt loam, pale brown (10YR 6/3) moist; massive; hard, firm, slightly sticky and slightly plastic; very few fine roots; common fine tubular pores; 35 percent limestone gravel with calcium carbonate coats and 15 percent cobbles; strongly calcareous; moderately alkaline.

Depth to the Cca horizon ranges from 10 to 20 inches. Calcium carbonate content is more than 15 percent. The cobbles and gravel are limestone, mostly coated with thick to medium layers of calcium carbonate.

The A horizon has value of 3 to 5 dry and 2 to 4 moist and chroma of 2 or 3. It is silty clay loam, clay loam, or loam. The lower part is gravelly clay loam or gravelly silty clay loam in some pedons.

The AC horizon has value of 4 or 5 dry. It is gravelly clay loam, gravelly silty clay loam, or gravelly loam.

The Cca horizon has value of 6 to 8 dry and 4 to 6 moist, and chroma of 2 to 4. It is cobbly or very gravelly silt loam, cobbly or very gravelly silty clay loam, cobbly or very gravelly clay loam, or very gravelly loam.

Pena Variant

The Pena Variant consists of deep, well drained soils that formed in medium and coarse textured residuum derived from basic igneous rock, primarily rhyolite, andesite, and latite. They are on steep mountainsides and lower parts of pediments. Slope is 20 to 65 percent. The mean annual precipitation is about 15 inches, and the mean annual air temperature is about 55 degrees F.

Pena Variant soils are similar to Pena, Shanta, Shanta Variant, Ruidoso, and Nickel soils, and are near Gabaldon, Alamogordo, Ruidoso, and Shanta soils. Pena soils have a calcic horizon. Shanta, Shanta Variant, and Ruidoso soils have a finer control section. Ruidoso soils have an argillic horizon. Nickel and Alamogordo soils have a thermic temperature regime and an aridic moisture regime. Alamogordo soils have a gypsic horizon. Gabaldon soils have finer texture, no gravel, and an irregular decrease in organic matter content.

Typical pedon of Pena Variant loam in an area of Pena Variant-Rock outcrop association, steep, northeast corner of sec. 2. T. 11 S., R. 9 1/2 E.:

A1—0 to 12 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium and fine granular structure; slightly hard, friable, nonsticky and nonplastic; common fine and very fine roots; common fine tubular pores; 10 percent gravel; strongly calcareous, lime disseminated; moderately alkaline; gradual smooth boundary.

B2—12 to 25 inches; brown (10YR 5/3) very gravelly loam, dark brown (10YR 3/3) moist; weak fine and very fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common fine and very fine roots; common fine tubular pores; 40 percent gravel; strongly calcareous, lime disseminated; moderately alkaline; abrupt smooth boundary.

IICca—25 to 60 inches; pale brown (10YR 6/3) extremely gravelly sandy loam, dark brown (10YR 4/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine roots; common fine tubular pores; strongly calcareous, some lime and gypsum coatings on many rock fragments; 70 percent gravel; moderately alkaline.

The solum ranges from 23 to 28 inches in thickness.

The A horizon has value of 3 or 4 dry. This horizon is generally loam with 5 to 15 percent gravel and 22 to 26 percent clay, but it ranges to clay loam.

The B2 horizon has value of 4 or 5 dry and chroma of 2 or 3. This horizon is generally very gravelly loam with 35 to 45 percent gravel and 22 to 26 percent clay, but it ranges to very gravelly clay loam.

The IICca horizon has value of 6 or 7 dry and 4 or 5 moist. The gravel content is 65 to 85 percent. Carbonates and gypsum make up less than 20 percent of the horizon.

Philder series

The Philder series consists of well drained soils that formed in alluvium influenced by eolian sediment. They are shallow over indurated caliche. They are on upland fans on pediments. Slope is 0 to 15 percent. Mean annual precipitation is about 14 inches, and the mean annual air temperature is about 60 degrees F.

Philder soils are similar to Jerag and Tencee soils. They are near Armesa, Reyab, Lozier, and Jerag soils. Tencee soils do not have a moisture regime bordering on the ustic. Armesa, Reyab, and Lozier soils do not have a petrocalcic horizon. Lozier soils are in a lithic subgroup. Jerag soils have an argillic horizon.

Typical pedon of Philder very fine sandy loam, 0 to 9 percent slopes, NE1/4SW1/4 sec. 20, T. 22 S., R. 13 E.:

A1—0 to 4 inches; brown (10YR 5/3) very fine sandy loam, dark brown (10YR 3/3) moist; moderate thin platy structure in upper 1/4 inch, weak fine and medium granular and weak fine subangular blocky structure below; soft, very friable, slightly sticky and nonplastic; common fine and very fine roots; many very fine and fine pores; extremely hard carbonate fragments less than 1/2 inch in diameter cover about 30 percent of the surface; slightly calcareous; mildly alkaline; clear smooth boundary.

B1ca—4 to 8 inches; brown (10YR 5/3) sandy clay loam, dark brown (10YR 4/3) moist; weak medium and fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine and very fine roots; many fine and very fine

pores; strongly calcareous; moderately alkaline; clear smooth boundary.

B2ca—8 to 12 inches; pale brown (10YR 6/3) gravelly sandy clay loam, dark yellowish brown (10YR 4/4) moist; weak fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine roots; many fine and very fine pores; about 30 percent gravel-size indurated carbonate nodules and 2 percent cobbles of the same material; strongly calcareous; moderately alkaline; clear wavy boundary.

C1ca—12 to 18 inches; pale brown (10YR 6/3) extremely gravelly silt loam, yellowish brown (10YR 5/4) moist; massive; soft, very friable, slightly sticky and nonplastic; common fine roots; many very fine pores; 85 percent cobbles and gravel, cobbles make up 5 percent, and gravel-size carbonate nodules make up 80 percent; strongly calcareous; moderately alkaline; abrupt wavy boundary.

C2cam—18 to 29 inches; white (10YR 8/2) carbonate-cemented material, white (10YR 8/2) moist; massive; extremely hard; upper 1/2 inch is laminar; large cobbles recemented or plugged by carbonates; strongly calcareous; moderately alkaline; clear wavy boundary.

C3ca—29 to 60 inches; white (10YR 8/2) very gravelly silt loam, very pale brown (10YR 7/3) moist; massive; very hard, firm, slightly sticky and slightly plastic; limestone cobbles and gravel coated with thick masses of carbonates, about 55 percent coarse fragments of which 15 percent is cobble size and 40 percent is gravel size, about half of each in the form of hard petrocalcic material; strongly calcareous; moderately alkaline.

Depth to the petrocalcic horizon ranges from 12 to 20 inches. A desert pavement of coarse fragments of extremely hard carbonate nodules generally less than 1/2 inch in diameter covers 20 to 45 percent of the surface.

The A horizon has value of 4 or 5 dry and 3 or 4 moist and chroma of 2 or 3. It is very fine sandy loam, fine sandy loam, or loam.

The B2 horizon has value of 4 to 6 dry and 4 or 5 moist. It is sandy clay loam, gravelly sandy clay loam, or gravelly loam and is less than 25 percent clay. This horizon has weak or moderate fine or medium subangular blocky structure.

The C1ca horizon has value of 6 or 7 dry and 4 to 6 moist and chroma of 3 or 4. It is very gravelly silt loam or very gravelly loam. Gravel is petrocalcic material and makes up 50 to 85 percent of the horizon. Cobbles make up 3 to 5 percent.

The Ccam horizon is continuously cemented except for scattered cracks and pipes of nonindurated material. The C3ca horizon has value of 7 or 8 moist and chroma of 2 or 3 dry. It is very gravelly or cobbly silt loam. Coarse fragments make up 50 to 80 percent of this horizon.

Pintura series

The Pintura series consists of deep, somewhat excessively drained soils that formed in coarse textured eolian material. They are on coppice dunes on uplands of 0 to 5 percent slopes. The dunes have slopes of 20 percent to more than 80 percent. The mean annual precipitation is about 9 inches, and the mean annual air temperature is about 61 degrees F.

Pintura soils are similar to and near Bluepoint soils and are near Berino, Dona Ana, Holloman, Onite, Tome, and Wink soils. Bluepoint soils are calcareous throughout. Berino, Onite, and Dona Ana soils have an argillic horizon. Holloman soils have bedded gypsum at a depth of 20 inches. Tome soils have a fine-silty control section. Wink soils have a calcic horizon.

Typical pedon of Pintura loamy fine sand in an area of Pintura-Dona Ana complex, 0 to 5 percent slopes, 200 feet west of the Escondida Siding, northwest corner of NW1/4 sec. 10, T. 20 S., R. 9 E.:

A1—0 to 12 inches; light reddish brown (5YR 6/4) loamy fine sand, reddish brown (5YR 4/4) moist; single grain; loose dry and moist; slightly calcareous; mildly alkaline; gradual wavy boundary.

C1—12 to 30 inches; light reddish brown (5YR 6/3) fine sand, reddish brown (5YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; slightly calcareous; mildly alkaline; gradual wavy boundary.

C2—30 to 60 inches; light reddish brown (5YR 6/4) loamy fine sand, reddish brown (5YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; slightly calcareous; mildly alkaline.

The A horizon has value of 4 to 6 dry and 3 to 5 moist and chroma of 3 or 4. It is loamy fine sand or fine sand.

The C horizon has value of 4 to 6 dry and 3 to 5 moist and chroma of 3 or 4. The C horizon is loamy sand, loamy fine sand, or fine sand. It ranges from noncalcareous to moderately calcareous.

Prelo series

The Prelo series consists of deep, well drained soils that formed in fine textured alluvium weathered from shale and siltstone. Prelo soils are on broad flood plains and lower parts of alluvial fans and pediments terminating on the basin floor. Slope is 0 to 3 percent. The mean annual precipitation is about 9 inches, and the mean annual air temperature is about 61 degrees F.

Prelo soils are similar to Largo, Prelo Variant, Tome, Reakor, Reeves, and Mimbres soils and are near Alamogordo, Prelo Variant, Mimbres, Aztec, Largo, Tome, and Reeves soils. Prelo Variant soils have a fine-loamy con-

trol section. Largo and Tome soils do not have a cambic horizon. Reakor and Reeves soils have a calcic horizon. Mimbres soils do not have gypsum in the C horizon. Alamogordo and Aztec soils have a gypsic horizon.

Typical pedon of Prelo silt loam, 0 to 3 percent slopes, in the southeast corner of the SE1/4SW1/4 sec. 4, T. 16 S., R. 10 E.:

A11—0 to 4 inches; reddish brown (5YR 5/4) silt loam, dark reddish brown (5YR 3/4) moist; weak very thin and thin platy structure in upper one inch, weak medium platy structure below; soft, friable, sticky and plastic; very few very fine and fine roots; common fine vesicular pores; moderately calcareous; moderately alkaline; clear smooth boundary.

A12—4 to 8 inches; reddish brown (5YR 4/4) silty clay loam, dark reddish brown (5YR 3/4) moist; moderate medium and fine subangular blocky structure; slightly hard, friable, sticky and plastic; very few fine roots; few fine tubular pores; moderately calcareous; moderately alkaline; clear smooth boundary.

B21—8 to 16 inches; reddish brown (5YR 4/4) silty clay loam, dark reddish brown (5YR 3/4) moist; moderate medium and fine subangular blocky structure; slightly hard, friable, sticky and plastic; very few fine roots; common fine tubular pores; few fine irregularly shaped soft masses and filaments of gypsum; strongly calcareous, lime disseminated; moderately alkaline; clear smooth boundary.

B22—16 to 24 inches; reddish brown (5YR 4/4) silty clay loam, dark reddish brown (5YR 3/4) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; few fine roots; common fine tubular pores; few fine irregularly shaped soft masses and filaments of gypsum; strongly calcareous, lime disseminated; moderately alkaline; clear smooth boundary.

B23—24 to 32 inches; reddish brown (5YR 4/4) silty clay loam, dark reddish brown (5YR 3/4) moist; weak medium and fine subangular blocky structure; slightly hard, friable, sticky and plastic; common fine tubular pores; few fine irregularly shaped soft masses and filaments of gypsum; strongly calcareous, lime disseminated; moderately alkaline; clear smooth boundary.

C1cs—32 to 45 inches; reddish brown (5YR 4/4) silty clay loam, dark reddish brown (5YR 4/4) moist; weak medium and fine subangular blocky structure; slightly hard, friable, sticky and plastic; common fine tubular pores; common fine irregularly shaped soft masses and filaments of gypsum; strongly calcareous, lime in small soft masses; moderately alkaline; clear smooth boundary.

C2—45 to 60 inches; reddish brown (5YR 5/4) silty clay loam, dark reddish brown (5YR 3/3) moist; massive; slightly hard, firm, sticky and plastic; common fine tubular pores; common fine irregularly shaped soft masses and filaments of gypsum and a few medium gypsum crystals; calcareous, lime in small soft masses; moderately alkaline.

The solum ranges from 25 to 40 inches in thickness. Gypsum content ranges from 3 to 5 percent in the B horizon and from 5 to 20 percent in the C horizon. Reaction ranges from mildly alkaline to moderately alkaline.

The A horizon has hue of 5YR or 7.5YR, value of 3 to 6 dry and 3 or 4 moist, and chroma of 3 or 4. It is silt loam, silty clay loam, fine sandy loam, or sandy loam.

The B horizon has hue of 7.5YR or 5YR, value of 3 to 5 dry and 3 or 4 moist, and chroma of 3 or 4 moist. It is silty clay loam, clay loam, or silt loam and averages 25 to 35 percent clay. The lower part of the B horizon ranges to clay loam in some pedons.

The C horizon has value of 3 to 6 dry and 3 or 4 moist. It is silty clay loam, silt loam, or clay loam, Gypsum content increases with depth, but there are no gypsum beds above a depth of more than 90 inches.

Prelo Variant

The Prelo Variant consists of deep, well drained soils that formed in mixed alluvium from Permian red beds. They are on the lower parts of side slopes of pediments. Slope is 0 to 3 percent. Mean annual precipitation is about 9 inches, and the mean annual air temperature is about 61 degrees F.

Prelo Variant soils are similar to Emot, Ogral, and Prelo soils. They are near Alamogordo, Largo, and Prelo soils. Emot, Largo, and Ogral soils do not have a cambic horizon. Prelo soils do not have gravel in the profile. Alamogordo soils have a gypsic horizon.

Typical pedon of Prelo Variant silt loam in an area of Prelo-Prelo Variant complex, 0 to 3 percent slopes, NE1/4NE1/4 sec. 3, T. 16 S., R. 9 E.:

A1—0 to 7 inches; reddish brown (5YR 4/4) silt loam dark reddish brown (5YR 3/3) moist; moderate fine and very fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; very few very fine roots; very few very fine pores; common fine filaments of gypsum; strongly calcareous; moderately alkaline; abrupt smooth boundary.

B21—7 to 13 inches; reddish brown (5YR 4/4) silt loam, dark reddish brown (5YR 3/4) moist; moderate medium, fine, and very fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots; few very fine tubular pores; few fine filaments of gypsum; strongly calcareous; moderately alkaline; abrupt smooth boundary.

B22cs—13 to 22 inches; reddish brown (5YR 4/4) silty clay loam, dark reddish brown (5YR 3/4) moist; massive; hard, friable, sticky and plastic; very few

fine roots; few very fine discontinuous pores; many fine filaments of gypsum; strongly calcareous; moderately alkaline; abrupt smooth boundary.

C1csca—22 to 30 inches; reddish brown (5YR 4/4) silty clay loam, dark reddish brown (5YR 3/4) moist; massive; hard, friable, sticky and plastic; very few fine roots; few very fine tubular pores; many fine filaments of gypsum; strongly calcareous; moderately alkaline; abrupt smooth boundary.

IIC2csca—30 to 60 inches; light reddish brown (5YR 6/4) very gravelly sandy loam, reddish brown (5YR 4/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; very few fine roots; few very fine interstitial pores; 60 percent rounded calcium carbonate coated gravel; strongly calcareous; moderately alkaline.

In places a desert pavement covers part of the surface. Depth to the very gravelly layer ranges from 25 to 35 inches.

The A horizon has value of 4 or 5 dry and 3 or 4 moist. It is silt loam, silty clay loam, very fine sandy loam, or fine sandy loam.

The B horizon has value of 4 or 5 dry and 3 or 4 moist and chroma of 3 or 4. It is silt loam, silty clay loam, or clay loam.

The C horizon has value of 4 or 5 dry and 3 or 4 moist. It is silty clay loam, or clay loam and is 0 to 10 percent gravel.

The IIC horizon has value of 5 or 6 dry and 4 or 5 moist. It is very gravelly sandy loam or very gravelly loamy sand and is 45 to 75 percent gravel.

Reakor series

The Reakor series consists of deep, well drained soils that formed in mixed alluvium weathered from limestone bedrock. Reakor soils are on uplands. Slope is 1 to 5 percent. The mean annual precipitation is about 10 inches, and the mean annual air temperature is about 61 degrees F.

Reakor soils are similar to Armesa and Jal soils and are near Tome, Tencee, and Lozier soils. Armesa and Jal soils have a fine-loamy control section. Tome soils do not have a calcic horizon. Tencee soils are shallow over a petrocalcic horizon. Lozier soils are shallow over bedrock.

Typical pedon of Reakor silty loam in an area of Reakor-Tome-Tencee association, gently sloping, SE1/4SW1/4 sec. 7, T. 23 S., R. 15 E.:

A1—0 to 4 inches; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; moderate medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; few fine roots; few very fine tubular and common fine interstitial pores; strongly calcareous; moderately alkaline; gradual smooth boundary.

B2ca—4 to 16 inches; pale brown (10YR 6/3) silt loam, brown (10YR 4/3) moist; moderate medium and coarse subangular blocky structure; slightly hard, friable, sticky and plastic; few fine roots; few very fine and fine tubular pores; strongly calcareous; moderately alkaline; gradual smooth boundary.

B3ca—16 to 28 inches; pale brown (10YR 6/3) silt loam, brown (10YR 5/3) moist; weak medium and coarse subangular blocky structure; slightly hard, friable, sticky and plastic; few fine roots; common fine and very fine tubular pores; strongly calcareous; moderately alkaline; clear smooth boundary.

Cca—28 to 60 inches; white (10YR 8/2) silt loam, light brownish gray (10YR 6/2) moist; few fine prominent yellow mottles; massive; slightly hard, friable, slightly sticky and slightly plastic; common fine tubular pores; strongly calcareous; moderately alkaline.

The A horizon has hue of 7.5YR or 10YR, value of 5 or 6 dry and 3 or 4 moist, and chroma of 2 to 4.

The B horizon has hue of 7.5YR or 10YR and value of 4 or 5 moist.

The C horizon has hue of 7.5YR or 10YR, value of 7 or 8 dry and 5 or 6 moist, and chroma of 2 to 4 dry and moist.

Some pedons mapped as Reakor soils contain 10 to 20 percent indurated caliche fragments throughout, which is outside the range defined for the Reakor series, but this difference does not affect the use and behavior of the soils.

Reeves series

The Reeves series consists of deep, well drained soils that formed in medium textured calcareous and gypsiferous alluvium. Reeves soils are on broad valley floors and alluvial toe slopes. Slope is 0 to 2 percent. Mean annual precipitation is about 9 inches, and the mean annual air temperature is about 64 degrees F.

Reeves soils are similar to and near Holloman soils. They are near Alamogordo, Crowflats, Tome, and Prelo soils. Holloman soils are less than 20 inches deep over gypsum. Prelo soils are less than 15 percent fine sand or coarser particles. Alamogordo soils have a coarse-loamy control section. Crowflats and Tome soils do not have a gypsic horizon and do not have gypsic mineralogy.

Typical pedon of Reeves very fine sandy loam, 0 to 1 percent slopes, about 1 mile south of intersection of U.S. Highways 70 and 54, SW1/4SW1/4NW1/4 sec. 12, T. 17 S., R. 9 E.:

A1—0 to 8 inches; pale brown (10YR 6/3) very fine sandy loam, dark brown (10YR 4/3) moist; moderate medium platy structure; slightly hard, very friable, slightly sticky and slightly plastic; few fine and medium roots; common very fine and fine interstitial

pores; strongly calcareous; moderately alkaline; clear smooth boundary.

B21—8 to 13 inches; brown (10YR 5/3) silt loam, dark brown (10YR 4/3) moist; moderate medium and fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few fine and medium roots; common very fine tubular pores; strongly calcareous; moderately alkaline; clear smooth boundary.

B22ca—13 to 20 inches; pale brown (10YR 6/3) silt loam, dark brown (10YR 4/3) moist; weak medium and fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine tubular pores; strongly calcareous; moderately alkaline; clear smooth boundary.

C1ca—20 to 32 inches; very pale brown (10YR 7/3) sandy clay loam, brown (10YR 5/3) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; strongly calcareous; moderately alkaline; clear smooth boundary.

C2csca—32 to 38 inches; light brown (7.5YR 6/4) fine sandy loam, brown (7.5YR 5/4) moist; soft, very friable, nonsticky and nonplastic; few very fine tubular pores; strongly calcareous; moderately alkaline; clear smooth boundary.

C3csca—38 to 60 inches; pink (7.5YR 7/4) silt loam, light brown (7.5YR 6/4) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few very fine tubular pores; strongly calcareous; moderately alkaline.

The depth to the gypsic horizon ranges from 20 to 40 inches.

The A horizon has hue of 7.5YR or 10YR, value of 5 or 6 dry, and chroma of 2 to 4. It is very fine sandy loam or silt loam.

The B2 horizon has hue of 7.5YR or 10YR, value of 4 to 6 dry and 3 or 4 moist, and chroma of 2 to 4. It is silt loam, clay loam, or loam but in some pedons contains a few thin lenses of very fine sandy loam in the upper part.

The C1ca horizon has hue of 7.5YR or 10YR, value of 6 to 8 dry and 5 to 7 moist, and chroma of 3 or 4. It is sandy clay loam, clay loam, or loam. The Ccs horizon has hue of 7.5YR or 10YR, value of 6 to 8 dry and 5 to 7 moist, and chroma of 2 or 4 dry and 4 moist. It is silt loam, loam, or fine sandy loam.

Reeves Variant

The Reeves Variant consists of deep, well drained soils that formed in gypsiferous alluvium. They are on alluvial pediments above the present valley floor. Slope is 2 to 5 percent. The mean annual precipitation is about 14 inches, and the mean annual air temperature is about 56 degrees F.

The Reeves Variant soils are similar to Holloman Variant, Alamogordo, Holloman, and Reeves soils and are near Shanta, Gabaldon, and Ruidoso soils. Holloman Variant soils overlie bedded gypsum. Alamogordo and Holloman soils are warmer and do not have a mollic epipedon. Holloman soils overlie bedded gypsum. Reeves soils are warmer and do not have a mollic epipedon. Shanta soils do not have a gypsic horizon and have a thicker mollic epipedon. Gabaldon soils do not have a gypsic horizon and are less than 15 percent fine sand or coarser particles in the control section. Ruidoso soils have an argillic horizon and do not have a gypsic horizon.

Typical pedon of Reeves Variant very fine sandy loam in an area of Reeves Variant-Shanta association, gently sloping, 0.3 mile north of windmill, 20 feet east of road, SW1/4 sec. 18, T. 11 S., R. 10 E.:

A1—0 to 7 inches; brown (10YR 5/3) very fine sandy loam, dark brown (10YR 3/3) moist; weak medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and medium roots; common fine tubular pores; strongly calcareous, lime disseminated; moderately alkaline; clear smooth boundary.

B21—7 to 12 inches; pale brown (10YR 6/3) loam, yellowish brown (10YR 5/4) moist; moderate medium and fine subangular blocky structure; slightly hard, friable, sticky and plastic; few fine and medium roots; common fine tubular pores; strongly calcareous, lime disseminated; moderately alkaline; clear smooth boundary.

B22cs—12 to 16 inches; pink (7.5YR 7/4) silt loam, brown (7.5YR 5/4) moist; moderate medium and fine subangular blocky structure; slightly hard, friable, sticky and slightly plastic; few fine and medium roots; common fine tubular pores; soft masses of gypsum present on faces of peds; strongly calcareous, lime disseminated; moderately alkaline; abrupt smooth boundary.

C1cs—16 to 29 inches; pink (7.5YR 8/4) loam, brown (7.5YR 5/4) moist; moderate medium and fine subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; very few fine roots; common fine tubular pores; about 35 percent gypsum in form of soft masses and filaments, a few petrogypsic lenses which are discontinuous; strongly calcareous, lime disseminated; moderately alkaline; clear smooth boundary.

C2cs—29 to 60 inches; light brown (7.5YR 6/4) clay loam, brown (7.5YR 5/4) moist; weak fine and medium subangular blocky structure; hard, firm, sticky and slightly plastic; very few fine roots; common fine tubular pores; about 25 percent gypsum in form of crystals, soft masses, some gypsum cementation between and within peds;

strongly calcareous, lime disseminated; moderately alkaline.

The A horizon has hue of 10YR, 7.5YR, value of 4 or 5 dry, and chroma of 2 or 3 moist. It is very fine sandy loam or fine sandy loam.

The B horizon has value of 5 to 7 dry and 4 or 5 moist. Gypsum is present in the lower part of this horizon in most pedons.

The C1cs horizon is a gypsic horizon and contains about 35 percent gypsum. It has value of 5 or 6 moist. Texture is hard to determine because of the large amount of gypsum present but is loam or silt loam. The C2cs horizon has value of 4 or 5 moist. The gypsum content decreases with depth, and there is some cementation of gypsum in the upper part in some pedons.

Reyab series

The Reyab series consists of deep, well drained soils that formed in alluvium weathered mainly from limestone. They are on alluvial bottoms, terraces, and fans on broad uplands. Slope is 0 to 5 percent. The mean annual precipitation is about 14 inches, and the mean annual air temperature is about 60 degrees F.

Reyab soils are similar to Crowflats, Largo, and Tome soils and are near Armesa, Jerag, Lozier, and Philder soils. Crowflats soils have highly stratified layers and decrease irregularly in organic matter content with depth. Largo and Tome soils are dry in all parts of the moisture control section three-quarters or more of the time (cumulative) that the soil temperature at a depth of 50 cm is 5 degrees C or higher. Largo soils have hue of 7.5YR or redder throughout. Armesa soils have a calcic horizon between depths of 10 and 20 inches. Jerag soils have an argillic horizon and a petrocalcic horizon at a depth of less than 20 inches. Lozier soils have a calcic horizon and are less than 20 inches thick over limestone bedrock. Philder soils have a petrocalcic horizon at a depth of less than 20 inches.

Typical pedon of Reyab loam in an area of Reyab-Armesa association, gently sloping, on Otero Mesa about 11.8 miles south on County Road 506 from the guard station at the east gate of the McGregor Missile Range and 250 feet west of road, NW1/4NW1/4 sec. 15, T. 24 S., R. 13 E.:

A1—0 to 4 inches; light gray (10YR 7/2) loam, dark brown (10YR 3/3) moist; weak medium platy and weak medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; few very fine tubular pores; strongly calcareous, lime disseminated; moderately alkaline; clear smooth boundary.

B21—4 to 12 inches; light gray (10YR 7/2) silt loam, dark brown (10YR 4/3) moist; weak medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; few very fine tubular pores; strongly calcareous, lime disseminated; moderately alkaline; gradual smooth boundary.

B22—12 to 25 inches; very pale brown (10YR 7/3) silt loam, brown (10YR 5/3) moist; weak coarse and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; few very fine tubular pores; strongly calcareous, lime disseminated; moderately alkaline; gradual smooth boundary.

C—25 to 60 inches; very pale brown (10YR 7/3) silt loam, brown (10YR 5/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; few very fine tubular pores; strongly calcareous, lime disseminated; moderately alkaline.

The solum is 20 to 40 inches thick. Depth to bedrock is 60 inches or more.

The A horizon is light gray, light grayish brown, grayish brown, pale brown, and brown; it has value of 5 to 7 dry and chroma of 2 or 3. This horizon is loam or silt loam.

The B2 horizon is light gray, very pale brown, grayish brown, light brown, and brown; it has hue of 10YR or 7.5YR, value of 5 to 7 dry, and chroma of 2 to 4. This horizon is silt loam or light silty clay loam. Structure is weak to moderate.

The C horizon is very pale brown, light gray, grayish brown, pale brown, or light brown; it has hue of 10YR or 7.5YR, value of 5 to 7 dry, and chroma of 2 to 4. This horizon is silt loam or light silty clay loam.

Ruidoso series

The Ruidoso series consists of deep, well drained soils that formed in fine textured alluvium. They are on dissected alluvial fans. Slope is 0 to 3 percent. Mean annual precipitation is about 14 inches, and the mean annual air temperature is about 56 degrees F.

Ruidoso soils are similar to and near Gabaldon and Shanta soils. Gabaldon and Shanta soils do not have an argillic horizon.

Typical pedon of Ruidoso fine sandy loam in an area of Ruidoso association, nearly level, about 8 miles east of Three Rivers on County Road 579, NE1/4NW1/4 sec. 7, T. 11 S., R. 10 E.:

A11—0 to 4 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common fine and very fine roots; common fine tubular pores; slightly calcareous; mildly alkaline; abrupt wavy boundary.

A12—4 to 21 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist;

moderate medium and coarse subangular blocky structure parting to moderate fine and very fine subangular blocky; slightly hard, friable, sticky and plastic; common fine and very fine roots; common fine tubular pores; moderately calcareous; mildly alkaline; gradual smooth boundary.

B21t—21 to 32 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate medium and fine subangular blocky structure; slightly hard, friable, sticky and plastic; common fine and very fine roots; common fine tubular pores; abrupt smooth boundary.

B22t—32 to 60 inches; brown (10YR 5/3) clay loam, dark brown (7.5YR 3/2) moist; strong medium and fine angular blocky structure; hard, firm, sticky and plastic; few fine and very fine roots; common fine tubular pores; strongly calcareous; mildly alkaline.

The solum is more than 40 inches thick. The mollic epipedon is more than 22 inches thick.

The A horizon has value of 4 or 5 dry.

The B21t horizon has hue of 10YR or 7.5YR and chroma of 2 or 3. It is silty clay loam, clay loam, silt loam, or heavy loam. Structure is weak or moderate. The B22t horizon has hue of 10YR or 7.5YR, value of 3 or 4 moist, and chroma of 2 to 4 moist. Texture is clay loam, silty clay loam, or heavy loam. This horizon has moderate or strong subangular or angular blocky structure.

About 80 percent of the soils mapped as Ruidoso soils in this survey area are 30 to 35 percent clay, which is outside the range defined for the series, but this difference does not affect the use and behavior of the soils.

Shanta series

The Shanta series consists of deep, well drained soils that formed in mixed alluvium. Shanta soils are on flood plains and valley bottoms. Slope is 0 to 2 percent. Mean annual precipitation is about 15 inches, and the mean annual air temperature is about 56 degrees F.

Shanta soils are similar to Gabaldon, Ruidoso, Pena, and Cale soils. They are near Gabaldon, Reeves Variant, and La Fonda soils. Gabaldon and Cale soils are less than 15 percent fine sand or coarser particles in the control section. Ruidoso soils are more than 35 percent clay in the control section. Pena soils have a calcic horizon and contain more than 35 percent gravel. Reeves Variant soils have a gypsic horizon. La Fonda soils do not have a mollic epipedon.

Typical pedon of Shanta loam in an area of Shanta-Gabaldon association, nearly level, SE1/4 sec. 7, T. 11 S., R. 10 E.:

A1—0 to 13 inches; dark brown (10YR 4/3) loam, very dark grayish brown (10YR 3/2) moist; moderate coarse, medium, and fine subangular blocky structure; slightly hard, friable, sticky and plastic; common fine and very fine roots; common fine tubular pores; moderately calcareous; mildly alkaline; gradual smooth boundary.

C1—13 to 27 inches; dark brown (10YR 4/3) silt loam, very dark grayish brown (10YR 3/2) moist; moderate medium and fine subangular blocky structure; slightly hard, friable, sticky and plastic; common fine and very fine roots; common fine tubular pores; moderately calcareous; moderately alkaline; clear smooth boundary.

C2—27 to 60 inches; brown (10YR 5/3) sandy loam, dark grayish brown (10YR 4/2) moist; weak coarse and medium subangular blocky structure; slightly hard, very friable, sticky and plastic; common fine and very fine roots; common fine tubular pores; moderately calcareous; moderately alkaline.

The A horizon has value of 4 or 5 dry and 2 or 3 moist and chroma of 2 or 3.

The C horizon has value of 4 or 5 dry in the upper part and 5 or 6 dry in the lower part and chroma of 2 to 4. Texture is normally silt loam, sandy loam, loam, or clay loam.

About 25 percent of the soils mapped as Shanta soils in this survey area have regular decrease in organic matter, which is not within the definition of the series, but this difference does not affect the use and behavior of the soils.

Shanta Variant

The Shanta Variant consists of deep, well drained soils that formed in mixed alluvium. They are on drainageways of dissected terraces and valley bottoms. Slope is 0 to 2 percent. Mean annual precipitation is about 12 inches, and the mean annual air temperature is about 60 degrees F.

Shanta Variant soils are similar to Gabaldon, Pena, Ruidoso, Shanta, and Cale soils. They are near Espy, Ector, and Lozier soils. Gabaldon soils have an irregular decrease in organic carbon content and have a mesic temperature regime. Pena soils have a calcic horizon and contain more than 35 percent gravel in the control section. Ruidoso soils are 35 percent or more clay in the control section and have a mesic temperature regime. Shanta soils have an irregular decrease in organic carbon content, are 15 percent or more fine sand or coarser particles, and have a mesic temperature regime. Cale soils have an argillic horizon and a mesic temperature regime. Espy soils have a petrocalcic horizon at a depth of less than 20 inches. Ector and Lozier soils have limestone bedrock at a depth of less than 20 inches.

Typical pedon of Shanta Variant silt loam in an area of Espy-Shanta Variant associaton, gently sloping, SW1/4SW1/4 sec. 15, T. 21 S., R. 16 E.:

A11—0 to 9 inches; brown (10YR 5/3) silt loam, very dark grayish brown (10YR 3/2) moist; weak moderate and fine subangular blocky structure; soft, friable, sticky and plastic; common fine and medium roots; common fine tubular pores; mildly alkaline; clear smooth boundary.

A12—9 to 12 inches; brown (10YR 4/3) silt loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; hard, friable, sticky and plastic; common fine roots; common fine tubular pores; slightly calcareous; mildly alkaline; abrupt smooth boundary.

B21—12 to 28 inches; brown (10YR 4/3) silt loam, dark yellowish brown (10YR 3/4) moist; moderate fine and medium angular blocky structure; hard, friable, sticky and plastic; few fine and very fine roots; common fine tubular pores; slightly calcareous; moderately alkaline; gradual smooth boundary.

B22ca—28 to 60 inches; brown (10YR 4/3) silt loam, dark yellowish brown (10YR 3/4) moist; moderate fine and medium angular blocky structure; hard, friable, sticky and plastic; few fine and very fine roots; common fine tubular pores; slightly calcareous, lime segregated in thin filaments and threads; moderately alkaline.

The A horizon is silt loam or very fine sandy loam. The B horizon has value of 4 or 5 dry and 3 or 4 moist. It is silt loam or silty clay loam.

Tencee series

The Tencee series consists of well drained soils that formed in gravelly calcareous alluvium. They are shallow over indurated caliche. They are mainly on side slopes of pediments and the upper parts of the older alluvial fans at the base of limestone hills and escarpments. Slope is 0 to 10 percent. The mean annual precipitation is about 10 inches, and the mean annual air temperature is about 60 degrees F.

Tencee soils are similar to and near Lozier, Philder, and Nickel soils and are near Reakor, Reyab, and Tome soils. Lozier soils are underlain by bedrock at a depth of less than 20 inches. Philder and Reyab soils have a ustic-aridic moisture regime. Nickel and Reakor soils are deep and have a calcic horizon. Tome soils have a fine-silty control section.

Typical pedon of Tencee very gravelly sandy loam in an area of Reakor-Tome-Tencee association, gently sloping, about 50 feet east of the southwest corner of SE1/4NW1/4 sec. 20, T. 21 S., R. 13 E.:

A1—0 to 4 inches; light brownish gray (10YR 6/2) very gravelly sandy loam, brown (10YR 4/3) moist; weak fine and medium granular structure; slightly hard, very friable, nonsticky and nonplastic; common very fine roots; common fine interstitial pores; 45 percent gravel; strongly calcareous; moderately alkaline; clear wavy boundary.

C1ca—4 to 15 inches; very pale brown (10YR 7/3) very gravelly sandy loam, pale brown (10YR 6/3) moist; part weak fine and medium granular structure, part massive; slightly hard, very friable, nonsticky and nonplastic; common very fine and few medium roots; common fine interstitial pores; 65 percent gravel; strongly calcareous; moderately alkaline; abrupt wavy boundary.

C2cam—15 to 25 inches; white (10YR 8/1) carbonate-cemented material, very pale brown (10YR 7/3) moist; extremely hard; strongly calcareous; moderately alkaline; diffuse wavy boundary.

C3ca—25 to 60 inches; white (10YR 8/1) extremely cobbly loam, very pale brown (10YR 7/3) moist; massive; soft, friable, slightly sticky and nonplastic; strongly calcareous; 85 percent carbonate coated cobbles and fractured rounded petrocalcic fragments; moderately alkaline.

Gravel is carbonate coated limestone fragments and semirounded to angular petrocalcic fragments. Gravel content ranges from 35 to more than 80 percent, by volume. Depth to the petrocalcic horizon ranges from 6 to 20 inches.

The A horizon has hue of 7.5YR or 10YR, value of 5 to 7 dry and 3 to 5 moist, and chroma of 2 to 4. It is very gravelly sandy loam or very gravelly silt loam.

The C1ca horizon has value of 7 or 8 dry and 6 or 7 moist and chroma of 2 or 3. The Ccam horizon has hue of 7.5YR or 10YR and chroma of 1 to 3 moist. The C3ca horizon has value of 7 or 8 dry and chroma of 1 to 3. It is very cobbly loam or very gravelly loam.

Tobler series

The Tobler series consists of deep, well drained soils that formed in mixed alluvium. They are on coalescing alluvial fans and flood plains. Slope is 0 to 1 percent. The mean annual precipitation is about 9 inches, and the mean annual air temperature is about 61 degrees F.

Tobler soils are similar to McCullough soils and are near Largo and Prelo soils. McCullough soils have regular decrease in organic matter content. Largo and Prelo soils have a fine-silty control seciton.

Typical pedon of Tobler silt loam, 0 to 1 percent slopes, SW1/4 sec. 19, T. 15 S., R. 10 E.:

C1—0 to 2 inches; reddish brown (5YR 5/4) silt loam, dark reddish brown (5YR 3/4) moist; strong thin and very thin platy structure; slightly hard, friable, sticky and plastic; common fine and very fine roots; many very fine vesicular pores; strongly calcareous, lime disseminated; moderately alkaline; abrupt smooth boundary.

C2—2 to 7 inches; reddish brown (5YR 5/4) very fine sandy loam, dark reddish brown (5YR 3/3) moist; moderate thin and very thin platy structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; common very fine vesicular pores; strongly calcareous, lime disseminated; moderately alkaline; abrupt smooth boundary.

C3—7 to 8 inches; reddish brown (5YR 5/4) loam, dark reddish brown (5YR 3/4) moist; moderate thin and very thin platy structure; slightly hard, friable, sticky and plastic; common medium, fine, and very fine roots; common very fine vesicular pores; strongly calcareous, lime disseminated; moderately alkaline; abrupt smooth boundary.

C4—8 to 12 inches; reddish brown (5YR 5/4) fine sandy loam, dark reddish brown (5YR 3/3) moist; weak thin platy structure; soft, very friable, slightly sticky and nonplastic; common fine and very fine roots; common very fine interstitial pores; 2 percent gravel; strongly calcareous, lime disseminated; moderately alkaline; abrupt smooth boundary.

C5—12 to 14 inches; reddish brown (5YR 5/4) very fine sandy loam, dark reddish brown (5YR 3/4) moist; strong thin and very thin platy structure; slightly hard, very friable, slightly sticky and nonplastic; few fine and very fine roots; few very fine interstitial pores; strongly calcareous, lime disseminated; moderately alkaline; abrupt smooth boundary.

C6—14 to 23 inches; reddish brown (5YR 5/4) loamy fine sand, dark reddish brown (5YR 3/4) moist; single grain; loose dry and moist; few coarse and medium and common fine and very fine roots; common fine interstitial pores; 5 percent gravel; strongly calcareous, lime disseminated; moderately alkaline; abrupt smooth boundary.

C7—23 to 24 inches; reddish brown (5YR 5/4) fine sandy loam, dark reddish brown (5YR 3/4) moist; weak thin platy structure; slightly hard, very friable, slightly sticky and slightly plastic; few very fine and fine roots; few very fine interstitial pores; strongly calcareous, lime disseminated; moderately alkaline; gradual wavy boundary.

C8—24 to 25 inches; reddish brown (5YR 5/4) loamy fine sand, dark reddish brown (5YR 3/4) moist; moderate thin and very thin platy structure; soft, very friable, slightly sticky and slightly plastic; few fine and very fine roots; few fine interstitial pores; strongly calcareous, lime disseminated; moderately alkaline; abrupt smooth boundary.

C9—35 to 50 inches; reddish brown (5YR 5/4) loamy sand, dark reddish brown (5YR 3/4) moist; weak thin platy structure; soft, very friable, nonsticky and nonplastic; few fine and very fine roots; strongly calcareous, lime disseminated; moderately alkaline; gradual wavy boundary.

IIB2t—50 to 65 inches; reddish brown (5YR 4/4) silty clay loam, dark reddish brown (5YR 3/4) moist; weak medium subangular blocky structure; slightly hard, friable, sticky and plastic; few fine and very fine roots; common fine tubular pores; some gypsum crystals present intermixed with the lime; strongly calcareous, lime occurs as soft irregular shaped masses; moderately alkaline.

The soil has value of 4 or 5 dry and 3 or 4 moist. The soil is highly stratified with any of the following textures: silt loam, very fine sandy loam, loam, fine sandy loam, loamy fine sand, or loamy sand.

Tome series

The Tome series consists of deep, well drained soils that formed in mixed alluvium. They are on broad valley floors. Slope is 0 to 5 percent. Mean annual precipitation is about 9 inches, and the mean annual air temperature is about 61 degrees F.

Tome soils are similar to and near Largo, Prelo, and Mimbres soils. They are near Aztec, Alamogordo, Emot, Reakor, Tencee, Jal, Pintura, Dona Ana, Reeves, and Ogral soils. Mimbres soils have a cambic horizon. Largo soils have hue of 7.5YR or redder. Ogral soils have hue of 5YR. Aztec and Alamogordo soils have a gypsic horizon. Aztec, Emot, and Tencee soils contain more than 35 percent gravel in the control section. Reeves soils have a calcic horizon and a gypsic horizon. Prelo soils have a cambic horizon and have hue of 7.5YR or redder. Reakor and Jal soils have a calcic horizon. Pintura soils are sandy throughout. Dona Ana soils have an argillic horizon.

Typical pedon of Tome silt loam, 0 to 5 percent slopes, SW1/4SE1/4 sec. 18, T. 23 S., R. 18 E.:

A11—0 to 1 inch; pale brown (10YR 6/3) silt loam, dark grayish brown (10YR 4/2) moist; moderate medium platy structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; few very fine tubular pores; strongly calcareous; moderately alkaline; abrupt smooth boundary.

A12—1 inch to 5 inches; pale brown (10YR 6/3) silt loam, brown (10YR 4/3) moist; weak medium subangular blocky and very coarse granular structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; common fine tubular pores; strongly calcareous; moderately alkaline; gradual smooth boundary.

AC—5 to 14 inches; pale brown (10YR 6/3) silt loam, brown (10YR 4/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; common fine tubular pores; strongly calcareous; moderately alkaline; gradual smooth boundary.

C—14 to 60 inches; pale brown (10YR 6/3) silt loam, brown (10YR 4/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine and

very fine roots; common fine tubular pores; strongly calcareous; moderately alkaline.

The A horizon has hue of 10YR or 7.5YR, value of 5 or 6 dry and 4 or 5 moist, and chroma of 2 to 4. It is loam, silt loam, or very fine sandy loam. In some pedons there is a thin layer of C material present on the surface, normally less than 1 inch thick.

The AC horizon has value of 5 or 6 dry and 3 or 4 moist and chroma of 3 or 4. It is silt loam, loam, or very fine sandy loam and has less than 15 percent material coarser than very fine sand.

The C horizon has value of 5 to 7 dry and 4 or 5 moist and chroma of 3 or 4. It is very fine sandy loam, loam, silt loam, or light silty clay loam.

Soils mapped in the detailed area as Tome soils have hue of 7.5YR in some pedons, which is outside the range defined for the Tome series, but this difference does not affect the use and behavior of the soils.

Tortugas series

The Tortugas series consists of shallow, well drained soils that formed in residuum from limestone and calcareous sandstone. Tortugas soils are on hills. Slope is 5 to 40 percent. Mean annual precipitation is about 14 inches, and the mean annual air temperature is about 52 degrees F.

Tortugas soils are near Dye, Encierro, Montecito, and Deama soils. Dye, Encierro, and Montecito soils have an argillic horizon. Deama soils have a calcic horizon.

Typical pedon of Tortugas cobbly loam, 5 to 30 percent slopes, NW1/4NE1/4 sec. 32, T. 20 S., R. 19 E.:

A11—0 to 4 inches; dark grayish brown (10YR 4/2) cobbly loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; slightly hard, firm, sticky and slightly plastic; many very fine and fine roots; many very fine interstitial pores; 5 percent gravel, 30 percent cobbles; slightly calcareous; moderately alkaline; clear smooth boundary.

A12—4 to 10 inches; dark grayish brown (10YR 4/2) extremely cobbly clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; hard, firm, sticky and slightly plastic; many very fine and fine roots; many very fine interstitial pores; 5 percent gravel, 70 percent cobbles; strongly calcareous; moderately alkaline; abrupt irregular boundary.

R—10 inches; fractured limestone with soil material in rock fractures; common fine roots along cracks in rocks; thin discontinuous layer of calcium carbonate on top surface of limestone; strongly calcareous.

The solum ranges from 6 to 20 inches in thickness. The soil contains more than 40 percent calcium carbonate. Coarse fragments make up 30 to 80 percent of the solum.

The A1 horizon is grayish brown or dark grayish brown cobbly loam, very cobbly clay loam, or extremely cobbly clay loam.

Wink series

The Wink series consists of deep, well drained soils that formed in calcareous eolian sediment. They are on upland pediments. Slope is 0 to 3 percent. Mean annual precipitation is about 8 inches, and the mean annual air temperature is about 63 degrees F.

Wink soils are similar to Armesa, Reeves, Jal, Bluepoint, and Pintura soils. They are near Bluepoint, Onite, Pintura, Berino, Holloman, and Dona Ana soils. Armesa, Reeves, and Jal soils are more than 18 percent clay in the fine earth fraction. Reeves soils have gypsic mineralogy, and Jal soils have carbonatic mineralogy. Bluepoint and Pintura soils do not have a calcic horizon. Onite soils have an argillic horizon and do not have a calcic horizon. Berino and Dona Ana soils are more than 18 percent clay in the control section and have an argillic horizon. Holloman soils are less than 20 inches thick over gypsum.

Typical pedon of Wink loamy fine sand in an area of Bluepoint-Onite-Wink association, nearly level, SW1/4NW1/4 sec. 27, T. 26 S., R. 6 E.:

A11—0 to 2 inches; light brown (7.5YR 6/4) loamy fine sand, dark brown (7.5YR 4/4) moist; single grain; loose dry and moist, nonsticky and nonplastic; slightly calcareous, lime disseminated; moderately alkaline; clear smooth boundary.

A12—2 to 8 inches; light brown (7.5YR 6/4) sandy loam, brown (7.5YR 5/4) moist; weak medium and coarse granular structure; soft, very friable, nonsticky and nonplastic; slightly calcareous, lime disseminated; moderately alkaline; clear smooth boundary.

B2—8 to 18 inches; brown (7.5YR 5/4) sandy loam, dark brown (7.5YR 4/4) moist; weak medium subangular blocky structure; slighty hard, very friable, nonsticky and nonplastic; slightly calcareous, lime disseminated; moderately alkaline; gradual wavy boundary.

C1ca—18 to 25 inches; pink (7.5YR 7/4) sandy loam, brown (7.5YR 5/4) moist; weak coarse subangular blocky structure; soft, very friable, nonsticky and nonplastic; moderately calcareous, lime disseminated and in soft nodules and mycelia; moderately alkaline; gradual wavy boundary.

C2ca—25 to 36 inches; pink (7.5YR 7/4) sandy loam, light brown (7.5YR 6/4) moist; massive; slightly hard, very friable, slightly sticky and nonplastic; strongly calcareous, lime disseminated and in soft nodules and mycelia; moderately alkaline; gradual wavy boundary.

C3—36 to 60 inches; light brown (7.5YR 6/4) sandy loam, brown (7.5YR 5/4) moist; massive; soft, very friable, slightly sticky and nonplastic; moderately calcareous, lime disseminated; moderately alkaline.

The depth to the Cca horizon ranges from 15 to 25 inches in most pedons but is as much as 35 inches in some pedons. Calcium carbonate content is more than 15 percent.

The A horizon has value of 5 or 6 dry and 4 or 5 moist. It is loamy fine sand, sandy loam, or fine sandy loam. A few pedons have an overburden of 2 to 10 inches of fine sand.

The B horizon has value of 5 or 6 dry and 4 or 5 moist and chroma of 3 or 4. It is sandy loam or fine sandy loam.

The Cca horizon has value of 7 or 8 dry. The C3 horizon has value of 5 or 6 dry. Texture is generally sandy loam, but is fine sandy loam or very fine sandy loam in some pedons.

Yesum series

The Yesum series consists of deep, well drained soils that formed in medium to coarse textured gypsiferous deposits. They are on broad basin floors. Slope is 0 to 5 percent. Mean annual precipitation is about 9 inches, and the mean annual air temperature is about 61 degrees F.

Yesum soils are similar to and near Alamogordo, Alamogordo Variant, Bluepoint, Holloman, Largo, Reeves, Prelo, and Tome soils. Alamogordo soils have more than 15 percent calcium carbonate equivalent and have lower concentrations of gypsum in the C horizon. Alamogordo Variant soils have a cambic horizon overlying the gypsic horizon. Holloman soils are less than 20 inches deep over bedded gypsum and do not have a gypsic horizon. Reeves soils have a fine-loamy control section and have a calcic horizon. Bluepoint soils are sandy and do not have a gypsic horizon. Largo, Prelo, and Tome soils are less than 15 percent fine sand or coarser particles and do not have a gypsic horizon.

Typical pedon of Yesum very fine sandy loam in an area of Holloman-Gypsum land-Yesum complex, 0 to 5 percent slopes, sec, 18, T. 16 S., R. 9 E.:

A1—0 to 3 inches; light brown (7.5YR 6/4) very fine sandy loam, brown (7.5YR 4/4) moist; weak thin platy structure; slightly hard, very friable, nonsticky and nonplastic; common fine roots; few fine vesicular pores; many fine gypsum crystals; slightly calcareous, calcium carbonate disseminated; mildly alkaline; clear smooth boundary.

C1cs—3 to 12 inches; light brown (7.5YR 6/4) fine sandy loam, brown (7.5YR 5/4) moist; weak coarse subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common fine roots; common fine pores; many fine gypsum crystals; slightly calcareous, calcium carbonate disseminated; mildly alkaline; clear smooth boundary.

C2cs—12 to 20 inches; pinkish white (7.5YR 8/2) very fine sandy loam, light brown (7.5YR 6/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine roots; common fine pores; many fine gypsum crystals; slightly calcareous, calcium carbonate disseminated; mildly alkaline; clear smooth boundary.

C3cs—20 to 26 inches; pink (7.5YR 7/4) very fine sandy loam, light brown (7.5YR 6/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine roots; common fine pores; many fine gypsum crystals; slightly calcareous, calcium carbonate disseminated; mildly alkaline; clear smooth boundary.

C4—26 to 60 inches; pink (7.5YR 7/4) very fine sandy loam, light brown (7.5YR 6/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; common fine pores; many fine gypsum crystals; slightly calcareous, calcium carbonate disseminated; moderately alkaline.

Depth to the gypsic horizon ranges from 2 to 6 inches. The calcium carbonate content is 3 to 15 percent.

The A horizon has hue of 7.5YR or 10YR; value of 5, 6, or 7 dry and 4 or 5 moist; and chroma of 3 or 4.

The Ccs horizon has hue of 7.5YR or 10YR, value of 5 to 8 dry and 4 to 6 moist, and chroma of 2 to 4. It is loam, very fine sandy loam, or fine sandy loam, with less than 18 percent clay and more than 15 percent fine sand or coarser particles, most of which is gypsum crystals.

Classification of the soils

The system of soil classification currently used was adopted by the National Cooperative Soil Survey in 1965. Readers interested in further details about the system should refer to "Soil taxonomy" (*9*).

The system of classification has six categories. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. In this system the classification is based on the different soil properties that can be observed in the field or those that can be inferred either from other properties that are observable in the field or from the combined data of soil science and other disciplines. The properties selected for the higher categories are the result of soil genesis or of factors that affect soil genesis. In table 26, the soils of the survey area are classified according to the system. Categories of the system are discussed in the following paragraphs.

ORDER. Ten soil orders are recognized as classes in the system. The properties used to differentiate among orders are those that reflect the kind and degree of dominant soil-forming processes that have taken place.

Each order is identified by a word ending in *sol*. An example is Aridisol.

SUBORDER. Each order is divided into suborders based primarily on properties that influence soil genesis and are important to plant growth or that are selected to reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Argid (*Arg*, meaning clayey, plus *id*, from Aridisol.

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of expression of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and a prefix that suggests something about the properties of the soil. An example is Haplargids (*Hapl*, meaning simple horizons, plus *argid*, the suborder of Aridisols that have an argillic horizon).

SUBGROUP. Each great group may be divided into three subgroups: the central (typic) concept of the great groups, which is not necessarily the most extensive subgroup; the intergrades, or transitional forms to other orders, suborders, or great groups; and the extragrades, which have some properties that are representative of the great groups but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that is thought to typify the great group. An example is Typic Haplargids.

FAMILY. Families are established within a subgroup on the basis of similar physical and chemical properties that affect management. Among the properties considered in horizons of major biological activity below plow depth are particle-size distribution, mineral content, temperature regime, thickness of the soil penetrable by roots, consistence, moisture equivalent, soil slope, and permanent cracks. A family name consists of the name of a subgroup and a series of adjectives. The adjectives are the class names for the soil properties used as family differentiae. An example is fine-loamy, mixed, thermic, Typic Haplargids.

SERIES. The series consists of soils that formed in a particular kind of material and have horizons that, except for texture of the surface soil or of the underlying substratum, are similar in differentiating characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineral and chemical composition.

Formation of the soils

This section discusses the factors of soil formation, relates them to the formation of soils in the survey area, and explains the processes of soil formation.

Soil is a collection of natural bodies occupying the earth's surface. Soil is capable of supporting plants and has properties due to the intergrated effect of climate and living matter acting on parent material conditioned by relief over a period of time. Soil is the result of interrelated actions by several processes on material deposited or accumulated by various geologic agencies. The characteristics of the soil at a given location are determined by the physical and chemical properties and mineralogical composition of its parent material, the climatic factors under which the soil material has accumulated or has been deposited, the plant and animal life on and in the soil, the relief or topography, and the length of time. These factors are extremely complex, and the effect of any one factor is hard to isolate and identify; but these interreactions are important to the nature of every soil. It is convenient, however, to discuss these factors separately and to indicate some of their probable effects of soil formation.

Parent material

The soils in the Otero Area formed in material derived from many sources, ranging from igneous and sedimentary rock to very recent alluvial and eolian sediment. The parent material has a strong effect on the type of soil developed and more importantly on the rate at which development takes place, since the physical and chemical composition of these materials is highly variable. These parent materials affect or determine the texture, structure, consistency, color, erodibility, and natural fertility of soils that develop in them. More than one factor may affect any property, such as color or texture.

Residuum, or residual material, is the result of physical and chemical weathering and breakdown of parent rock. This material has not moved, and the soil forms in place. Soils formed in sandstone residuum have different properties from the Lozier soils, which formed in limestone residuum. These differences are due to the different physical and chemical composition of the parent rock. Other soils formed in residuum are Deama and Ector soils, which formed over limestone bedrock. Pena Variant soils formed in deep residuum weathered from basic igneous volcanic rocks such as andesite, latite, and rhyolite on steep mountainsides.

Alluvial material is sediment that has been moved by water. There are various types of sediment—sand, gravel, clay, silt, and mixtures of these. The types and their location depend largely on the energy and carrying capacity of the streams or rivers involved. Many soils in the survey formed in very recent, fine textured alluvial material. Tome and Largo soils are examples; they have undergone little change since the parent sediment was deposited, although they are on an upland position which no longer floods. Prelo, Mimbres, and Gabaldon soils formed in the same type of sediment but are somewhat older, so they have developed a weak B horizon. Rui-

doso soils developed in the same kind of material, but they are very old and have a strong Bt horizon and a thick A horizon containing much organic matter. Some soils are developing on flood plains that are receiving deposits of parent material. These are the Crowflats and Tobler soils. They have no horizons other than a thin surface layer that undergoes very little alteration before the next thin layer of sediment is deposited.

Eolian material is wind-deposited sand or silt. This sediment may have been the surface of another soil but upon erosion and redeposition became parent material. Pintura soils are the most common and most extensive soils formed in this manner. They are on the many coppice dunes in the survey area. Bluepoint and Onite soils also formed in recent eolian material. Pintura and Bluepoint soils have developed only a very thin A horizon. In Onite soils some clay has moved downward in the profile, forming a B horizon. This indicates that these soils have been in place much longer than the other sandy soils. Gypsum deposits are of eolian and alluvial origin and are extensive in the survey area. Large volumes of gypsiferous material have been moved, generally only a short distance, and redeposited. Holloman, Alamogordo, and Yesum soils formed in these gypsum deposits.

Climate

Climate has a significant influence on the types and kinds of soils that formed, and the manner in which they form, in different geographic areas. In the Otero Area, temperature, precipitation, and wind play important parts in forming soil. When all other factors are equal, variations in climate determine the degree and nature of weathering and soil formation.

Temperature affects the rate of decomposition of parent material, the rate of biological activity, and the rate of chemical change within both the organic and inorganic systems. When air temperature is low, the soil temperature is correspondingly low and plants and animals reduce their activity. This is also true of the chemical processes which take place within the parent material and soil. Precipitation affects the rate of leaching of soil particles and bases, the rate of biological activity by cooling affects, and the amount of material moved within the soil. It also influences the type of vegetation present, which in turn also modifies the soil. Wind dries and cools the soil. It also adds dust, which contains materials such as calcium carbonate and gypsum. Wind can slow chemical reactions and biological activity by its cooling effect, thus slowing soil formation. It also acts as an erosive agent, forming dunes.

Climate may be either directly or indirectly responsible for variations in soil depth, soil color due to chemical change of iron staining, and chemical composition as a result of added calcium carbonate, gypsum, or soil material blown in.

The difference between Ector and Lozier soils is primarily due to climate. They both occur in warm areas and formed from limestone bedrock, but since the Ector soils receive more moisture, they developed a dark surface layer high in organic matter. This is a result of rainfall affecting vegetation, which in turn modifies the soil. More grass grows on Ector soils, and the added moisture aids in the biological breakdown and retention of this material in the soil.

Temperature is relatively uniform in the Area except in the Pinon and Guadalupe Mountains, where soil and air temperatures are cooler. Since these areas also receive more moisture, it is hard to identify a specific soil characteristically modified by temperature alone.

Wind shaped sand into coppice dunes on which Pintura and Bluepoint soils formed. Wind erosion is common in the basin area and much surface soil is lost each year. Erosion in one place leads to deposition in another, as evidenced by the carbonate recharge when dust particles are deposited on and partially leached into soils downwind. The depth to which this carbonate is moved in the soil depends on precipitation.

Relief

Relief is also known as topography or lay of the land. There are two basic parts of relief: slope and aspect.

The slope of an area regulates the amount of surface drainage and infiltration when all other factors are the same. Otherwise its effect depends on or is interrelated with the texture of the soil, type and density of vegetation, and climate. As the slope increases, the potential erosion increases. Largo and Prelo soils are commonly gullied where slope is 2 to 3 percent but are not eroded where slope is 0 to 1 percent. Normally as the slope decreases, soil formation processes increase due to more infiltration and percolation of water through the soil and a more rapid build-up of soil material through alluvial activity. Crowflats soils are deep, although they continue to receive soil additions and are still relatively young. Steep soils tend to be thin since soil material is eroded away at the rate of development or somewhat slower. Deama, Lozier, and Ector soils are examples of this, whereas downslope soils such as Reakor, Pena, and Cale soils are deep and well developed.

Aspect is the direction that the slope faces. It affects the available heat present for soil development and the amount of available moisture, although these properties also depend on other factors. If all other factors are constant, a north-facing slope is cooler than a south-facing slope. This is especially true near transition zones of temperature and rainfall regimes.

Plant and animal life

Plant and animal life includes fungi, bacteria, earthworms, insects, rodents, vegetation, mammals, and man.

The type of plants growing on a parent material determines to a large extent the amount of organic matter that will eventually be in the soil. Also, the vegetation may regulate certain chemical reactions in the soil and the type of micro-organisms which will be present (*5*). Philder and Reyab soils formed under mid grasses and have a relatively high amount of organic matter, while soils that formed predominantly under shrubs do not have that much organic matter. The micro-organisms present in these soils are similar but their numbers are different. Borrego and Cale soils formed under coniferous trees with an understory of grass. The micro-organisms in these soils differ from those in soils formed under only grass since the soils tend to be less alkaline under trees. This in turn alters the chemical reactions in the soil, so bases are removed much more rapidly. Insects, rodents, and larger mammals physically mix the soil and in extreme cases may completely alter or change the soil from one kind to another. Man alters soil or parent material by adding fertilizer, organic matter, and excess water, and by mechanically manipulating it. Some of the Prelo soils have a man-made surface horizon 30 to 40 inches thick that is high in organic matter and nitrates.

Time

In relation to the other soil forming factors, time is very important. The length of time that climate and plants and animals act on a given parent material on specific relief determines the degree of development.

Tome, Crowflats, Largo, Holloman, Ogral, and Emot soils are young. They have not developed any clear horizons other than a surface horizon. Prelo, Mimbres, Nickel, and La Fonda soils have existed long enough to allow some movement of clay and carbonates and to develop a weak B horizon or a calcic horizon or both (*4*). Philder, Jerag, Dona Ana, Berino, and Ruidoso soils have very strongly developed horizons. These soils developed either a thick, well developed argillic horizon or a very thick surface layer that is high in organic matter. These soils are at least 15,000 to 25,000 years old and formed under a different climate than is present today in the Otero Area.

Some soils develop horizons more rapidly than others because of the parent material. A gypsic horizon can form more rapidly than a calcic horizon when all factors except parent material are equal. Very few factors remain constant, so they all must be considered when determining the formation and resultant morphology of any specific soil.

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Glossary

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim. An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	More than 9

Badland. Steep or very steep, commonly nonstony barren land dissected by many intermittent drainage channels. Badland is most common in semiarid and

arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

Basin pitting. Mechanically scraping a pattern of shallow, (usually less than 1 foot deep) rectangular depressions in the surface of soils used for range in order to concentrate runoff. The collected water enhances establishment and growth of plants.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Blowout. A shallow depression from which all or most of the soil material has been removed by wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts the water table is exposed.

Bottom land. The normal flood plain of a stream, subject to frequent flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Brush mulching. Spreading cut or uprooted shrubs, either ground up or intact, on the soil to shade the soil or to add organic matter. Brush mulching enhances establishment of desirable plants on poor sites.

Calcareous soil. A soil containing enough calcium carbonate (commonly with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid. A soil having measurable amounts of calcium carbonate or magnesium carbonate.

Caliche. A more or less cemented deposit of calcium carbonate in soils of warm-temperate, subhumid to arid areas. Caliche occurs as soft, thin layers in the soil or as hard, thick beds just beneath the solum, or it is exposed at the surface by erosion.

Cat-step escarpment. A slope characterized by steplike ledges that interrupt the slope profile. The ledges may be natural, such as a series of rock exposures, or man-made, such as the banks of road cuts. The cat-steps curtail erosion and facilitate establishment of vegetation.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coat, clay skin.

Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse fragments. Mineral or rock particles up to 3 inches (2 millimeters to 7.5 centimeters) in diameter.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the bases of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures is difficult.

Compressible. Excessive decrease in volume of soft soil under load.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping (or contour farming). Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is 40 or 80 inches (1 or 2 meters).

Coppice dunes. Mounds of eolian or wind-deposited material around desert shrubs.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave. Unstable walls of cuts made by earth-moving equipment. The soil sloughs easily.

Deferred grazing. A delay in grazing until range plants have reached a specified stage of growth. Grazing is deferred in order to increase the vigor of forage and to allow desirable plants to produce seed. Contrasts with continuous grazing and rotation grazing.

Depth to rock. Bedrock at a depth that adversely affects the specified use.

Desert pavement. A thin, natural, smooth, residual concentration of wind-polished, closely packed pebbles, cobbles, and other rock fragments on the surface of soil. Wind action and sheetwash have continually removed all smaller particles from the pavement. The pavement protects the underlying finer textured material from further erosion.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically for long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients, as for example in "hillpeats" and "climatic moors."

Drilling. The deliberate mechanical placement and covering of seeds at a certain depth to optimize the effects of soil-related factors on germination of the seeds and establishment of seedlings.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by running water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes a bare surface.

Excess fines. Excess silt and clay. The soil does not provide a source of gravel or sand for construction purposes.

Excess lime. Excess carbonates. Excessive carbonates, or lime, restrict the growth of some plants.

Excess salts. Excess water soluble salts. Excessive salts restrict the growth of most plants.

Fast intake. The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when

light, moisture, temperature, tilth, and other growth factors are favorable.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flooding. The temporary covering of soil with water from overflowing streams, runoff from adjacent slopes, and tides. Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *occasional* that it occurs on an average of once or less in 2 years; and *frequent* that it occurs on an average of more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; *November-May*, for example, means that flooding can occur during the period November through May. Water standing for short periods after rainfall or commonly covering swamps and marshes is not considered flooding.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forage. Plant material used as feed by domestic animals. Forage can be grazed or cut for hay.

Forb. Any herbaceous plant not a grass or a sedge.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action. Freezing and thawing of soil moisture. Frost action can damage structures and plant roots.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material from 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Green manure (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table, which is the upper limit of saturation.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Gypsiferous. Containing large amounts of gypsum.

Gypsum. Hydrous calcium sulphate.

Habitat. The natural abode of a plant or animal; refers to the kind of environment in which a plant or animal normally lives, as opposed to the range or geographical distribution.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. The major horizons of mineral soil are as follows:

O horizon.—An organic layer, fresh and decaying plant residue, at the surface of a mineral soil.

A horizon.—The mineral horizon, formed or forming at or near the surface, in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon most of which was originally part of a B horizon.

A2 horizon.—A mineral horizon, mainly a residual concentration of sand and silt high in content of resistant minerals as a result of the loss of silicate clay, iron, aluminum, or a combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or a combination of these; (2) by prismatic or blocky structure; (3) by redder or browner colors than those in the A horizon; or (4) by a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that from which the solum is presumed to have formed. If the material is known to differ from that in the solum the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Hummocky. Refers to a landscape of hillocks, separated by low sags, having sharply rounded tops and steep sides. Hummocky relief resembles rolling or undulating relief, but the tops of ridges are narrower and the sides are shorter and less even.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered, but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Igneous rock. Rock that has been formed by the cooling of molten mineral material. Examples: granite, syenite, diorite, and gabbro.

Impervious soil. A soil through which water, air or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, invader plants are those that follow disturbance of the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Large stones. Rock fragments 10 inches (25 centimeters) or more across. Large stones adversely affect the specified use.

Lime. Chemically, lime is calcium oxide (CaO), but its meaning has been extended to include calcium and magnesium carbonates.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. Inadequate strength for supporting loads.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Nutrient, plant. Any element taken in by a plant, essential to its growth, and used by it in the production of food and tissue. Plant nutrients are nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, zinc, and perhaps other elements obtained from the soil; and carbon, hydrogen, and oxygen obtained largely from the air and water.

Pan. A compact, dense layer in a soil. A pan impedes the movement of water and the growth of roots. The word "pan" is commonly combined with other words that more explicitly indicate the nature of the layer; for example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan.*

Parent material. The great variety of unconsolidated organic and mineral material in which soil forms. Consolidated bedrock is not yet parent material by this concept.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pediment. A broad, flat or gently sloping, rock-floored erosion surface or plain of low relief, typically developed by subaerial agents (including running water) in an arid or semiarid region at the base of an abrupt and receding mountain front or plateau escarpment, and underlain by bedrock.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly. The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality that enables the soil to transmit water or air, measured as the number of inches per hour that water moves through the soil. Terms describing permeability are *very slow* (less than 0.06 inch), *slow* (0.06 to 0.20 inch), *moderately slow* (0.2 to 0.6 inch), *moderate* (0.6 to 2.0 inches), *moderately rapid* (2.0 to 6.0 inches), *rapid* (6.0 to 20 inches), and *very rapid* (more than 20 inches).

pH value. (See Reaction, soil). A numerical designation of acidity and alkalinity in soil.

Piping. Formation by moving water of subsurface tunnels or pipelike cavities in the soil.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Range (or rangeland). Land that, for the most part, produces native plants suitable for grazing by livestock; includes land supporting some forest trees.

Range condition. The health or productivity of forage plants on a given range, in terms of the potential productivity under normal climate and the best practical management. Condition classes generally recognized are—*excellent, good, fair,* and *poor.* The classification is based on the percentage of original, or assumed climax vegetation on a site, as compared to what has been observed to grow on it when well managed.

Range site. An area of range where climate, soil, and relief are sufficiently uniform to produce a distinct kind and amount of native vegetation.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulates over disintegrating rock.

Rill. A steep sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Riverwash. Unstabilized sandy, silty, clayey, or gravelly sediment that is flooded and washed and reworked so frequently that it supports little or no vegetation.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Root cutting. Mechanically severing roots below the ground with a plow or other implement in order to control undesirable woody plants.

Root plowing. Plowing of range with large machinery in such a manner that roots are cut several inches below the soil surface, destroying brushy plants with a minimum of disturbance to the soil.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged in stream channels from a drainage area. The water that flows off the land surface without sinking in is called surface runoff; that which enters the ground before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Seepage. The rapid movement of water through the soil. Seepage adversely affects the specified use.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and runoff water.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can

damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Sinkhole. A depression in a landscape where limestone has been locally dissolved.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Small stones. Rock fragments 3 to 10 inches (7.5 to 25 centimeters) in diameter. Small stones adversely affect the specified use.

Soil. A natural, three-dimensional body at the earth's surface that is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows: *very coarse sand* (2.0 millimeters to 1.0 millimeter); *coarse sand* (1.0 to 0.5 millimeter); *medium sand* (0.5 to 0.25 millimeter); *fine sand* (0.25 to 0.10 millimeter); *very fine sand* (0.10 to 0.05 millimeter); *silt* (0.05 to 0.002 millimeter); and *clay* (less than 0.002 millimeter).

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in mature soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristics of the soil are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stratified. Arranged in strata, or layers. The term refers to geologic material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates that are separated from adjoining aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil, or partly worked into the soil, to provide protection from soil blowing and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea. A stream terrace is frequently called a second bottom, in contrast with a flood plain, and is seldom subject to overflow. A marine terrace, generally wide, was deposited by the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt, silt loam, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or " very fine."

Thin layer. Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The condition of the soil, especially the soil structure, as related to the growth of plants. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Truncated. Cut down by accelerated erosion or mechanical means. The original upper part has been removed.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Unstable fill. Risk of caving or sloughing in banks of fill material.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but the limited geographic soil area does not justify creation of a new series.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Water table. The upper limit of the soil or underlying rock material that is wholly saturated with water.

Water table, apparent. A thick zone of free water in the soil. An apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Water table, artesian. A water table under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole.

Water table, perched. A water table standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

ILLUSTRATIONS

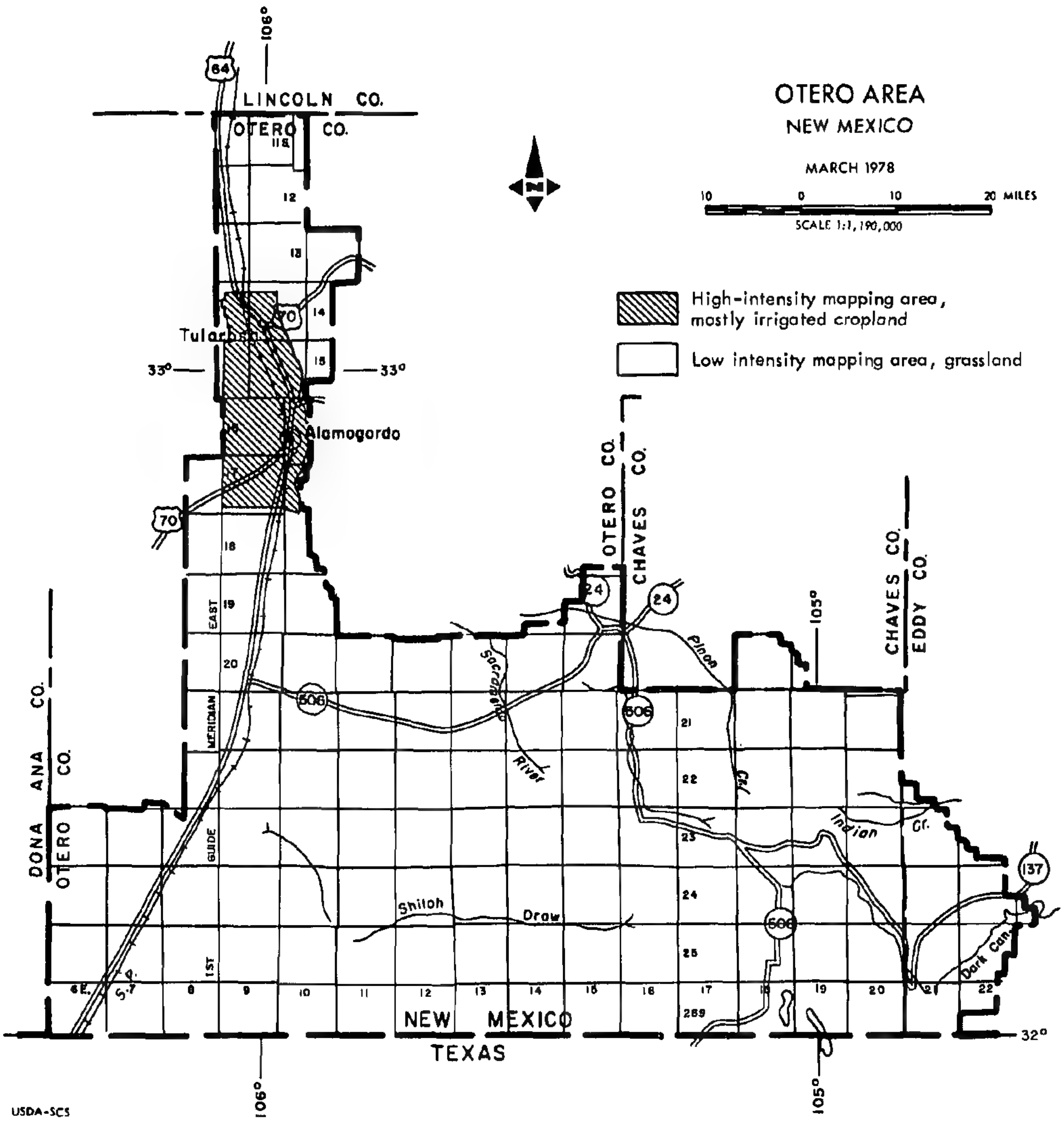

Figure 1.—Sketch map of the Otero Area with the area mapped at high detail shaded. The whole area was mapped at low detail.

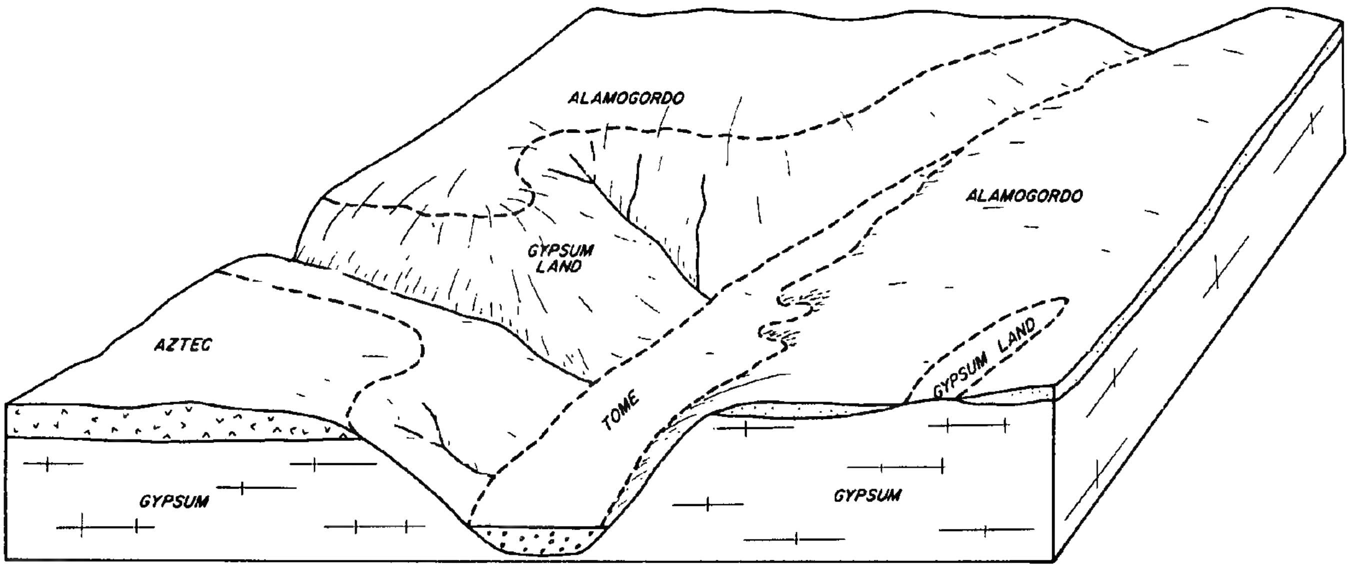

Figure 2.—Pattern of soils and landscape in Alamogordo-Gypsum land-Aztec map unit.

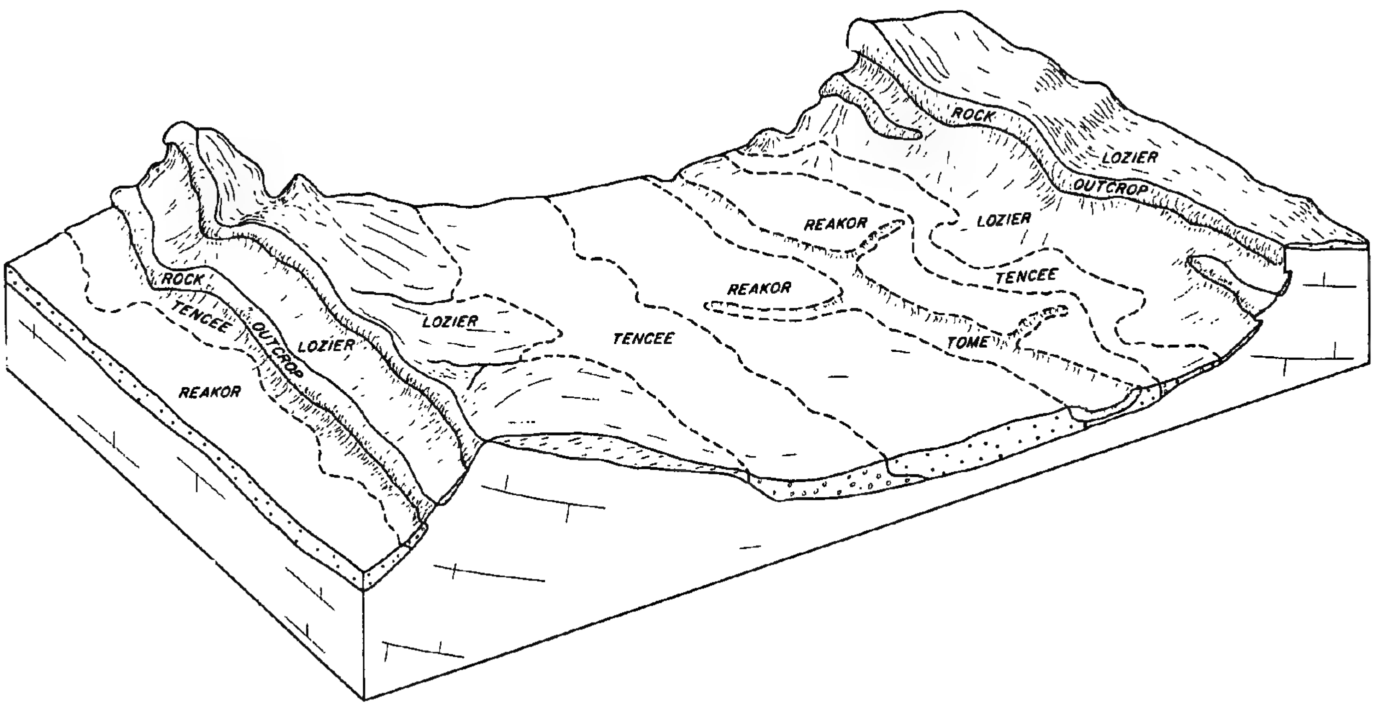

Figure 3.—Pattern of soils and landscape in Lozier-Rock outcrop and Reakor-Tome-Tencee map units.

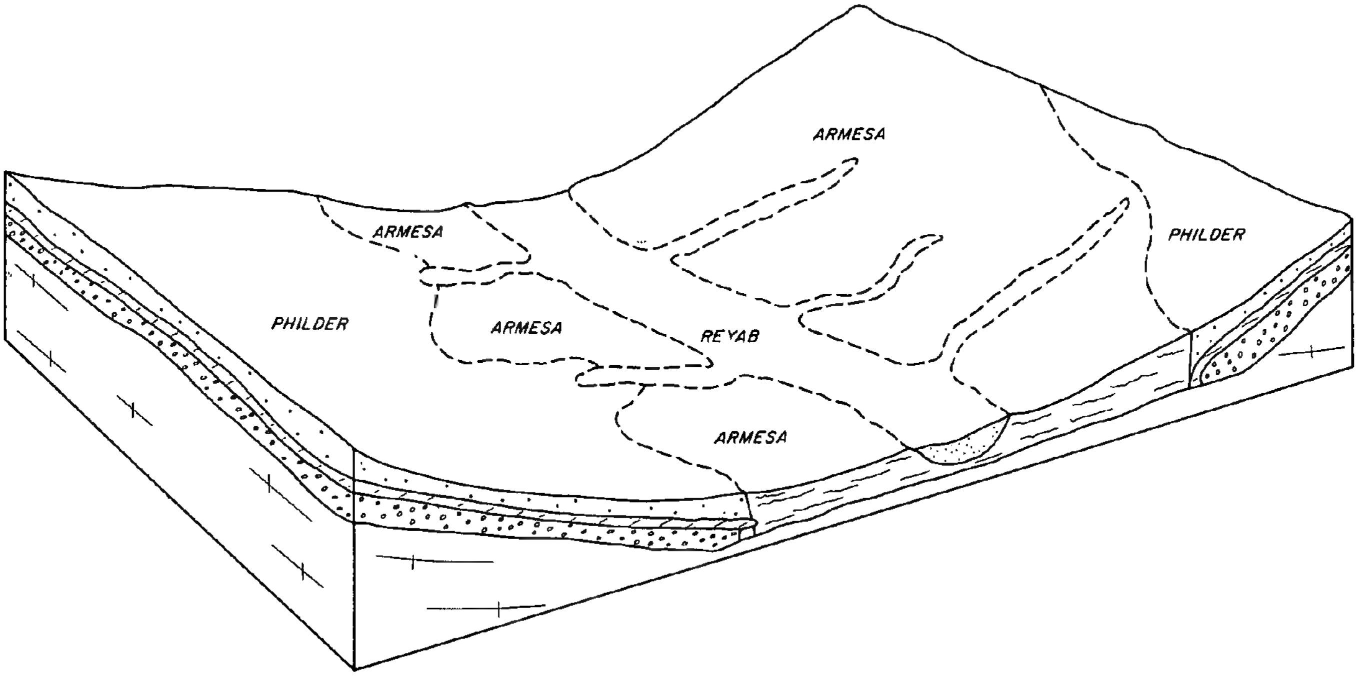

Figure 4.—Pattern of soils and landscape in Philder-Armesa-Reyab map unit.

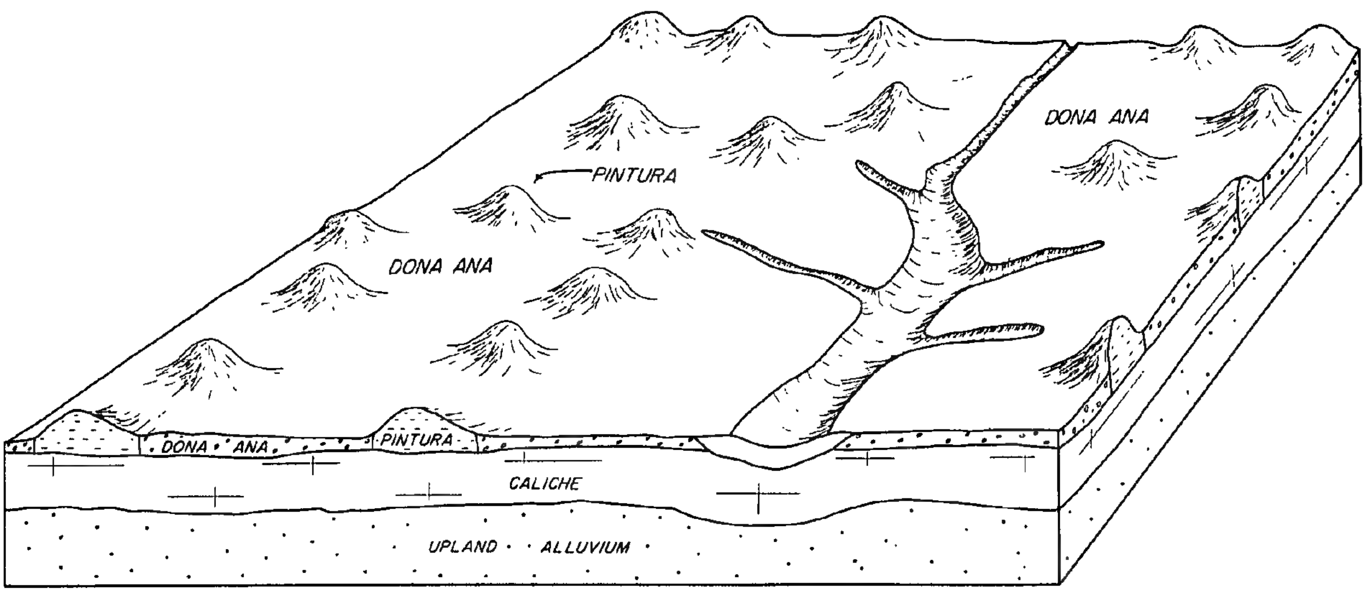

Figure 5.—Pattern of soils and landscape in Pintura-Dona Ana map unit.

Figure 6.—Typical area of Badland. The vegetation is mainly on included soils.

Figure 7.—Pena-Cale-Kerrick association, nearly level, in the foreground. Most of the oneseed juniper has invaded on the deep Cale soil. Deama-Rock outcrop complex, 20 to 50 percent slopes, on the hills in the background.

Figure 8.—Area of Pintura-Dona Ana complex, 0 to 5 percent slopes.

Figure 9.—Ruidoso association, nearly level, in foreground; Reeves Variant-Shanta association, gently sloping, on the terraces. The Sierra Blanca in the background is outside the survey area.

Figure 10.—Area of Gullied land showing deep gullies.

Figure 11.—Pecan grove on Largo silt loam, 0 to 1 percent slopes.

Figure 12.—Irrigated pasture on Prelo fine sandy loam, 0 to 1 percent slopes. The pasture is a mixture of tall fescue and Jose tall wheatgrass.

Figure 13.—Area of Prelo silt loam, 0 to 1 percent slopes, under natural vegetation.

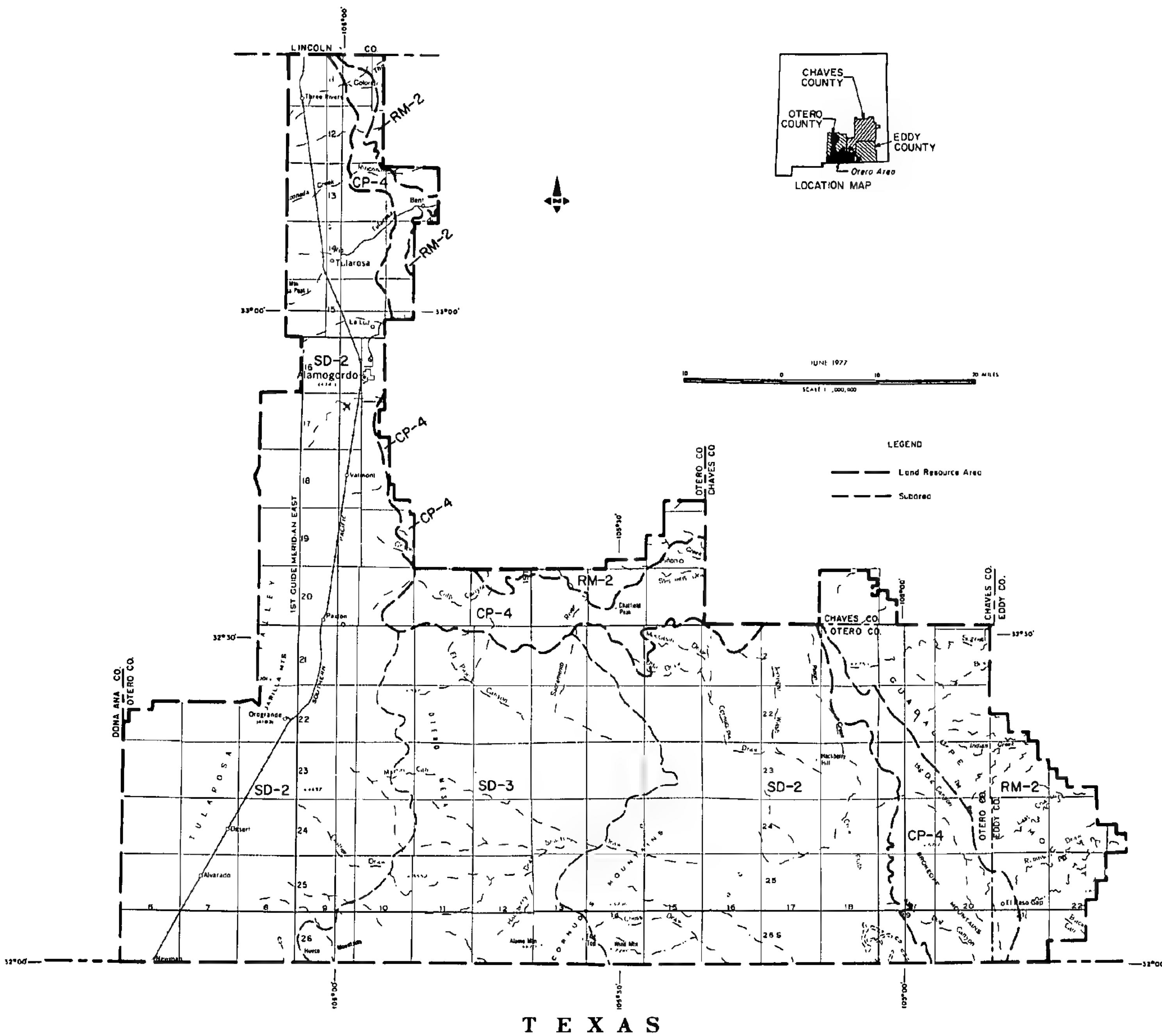

Figure 14.—Land resource areas and subareas in the Otero Area.

TABLES

TABLE 1.--TEMPERATURE AND PRECIPITATION DATA

[All data from Alamogordo, 1939-1941, 1944-1970, except data on snow cover which are from Orogrande, 1951-1970]

Month	Temperature				Precipitation				
	Average daily high	Average daily low	Average highest	Average lowest	Average	One year in 10 will have: Less than	One year in 10 will have: More than	Days with snow cover of 1.0 inch or more	Average depth of snow on days with snow cover
	°F	°F	°F	°F	In	In	In		In
January	56	27	69	11	0.7	(1)	1.4	1	2
February	61	31	74	17	0.5	(1)	1.0	(2)	3
March	67	36	80	22	0.5	(1)	1.0	(2)	3
April	78	44	88	31	0.3	(1)	0.7	0	---
May	87	53	97	40	0.4	(1)	1.4	0	---
June	95	62	103	50	0.7	(1)	1.3	0	---
July	95	65	103	58	1.9	0.9	3.3	0	---
August	93	63	100	57	1.8	0.2	3.0	0	---
September	88	58	97	46	1.4	0.1	2.9	0	---
October	78	46	88	34	0.9	(1)	1.6	0	---
November	65	34	76	20	0.4	(1)	1.0	(2)	2
December	58	28	69	15	0.6	(1)	1.3	(2)	3
Year	77	46	105	8	10.1	6.4	13.3	1	2

(1) Less than 0.05 inch.
(2) Less than 1/2.

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[All data from Alamogordo. Data for temperatures of 16° to 32° analyzed for period 1921-1950; for 36° to 40°, 1949-1969]

Probability	Minimum temperature						
	16° F or lower	20° F or lower	24° F or lower	28° F or lower	32° F or lower	36° F or lower	40° F or lower
LAST ~~First~~ freezing temperature in spring:							
1 year in 10 later than------	February 22	March 17	March 27	April 9	April 19	May 6	May 16
2 years in 10 later than------	February 13	March 6	March 19	April 3	April 15	May 1	May 12
5 years in 10 later than------	January 25	February 11	February 27	March 22	April 6	April 20	May 5
FIRST ~~Last~~ freezing temperature in fall:							
1 year in 10 later than------	December 4	November 16	November 7	November 2	October 28	October 10	October 4
2 years in 10 later than------	December 9	November 24	November 14	November 6	November 1	October 15	October 8
5 years in 10 later than------	December 22	December 9	November 27	November 16	November 9	October 23	October 17

TABLE 3.--ACREAGE AND PROPORTIONATE EXTENT OF THE LOW DETAIL MAP UNITS

Map symbol	Soil name	Otero County	Eddy County	Chaves County	Total--	
					Area	Extent
		Acres	Acres	Acres	Acres	Pct
AEC	Alamogordo-Gypsum land complex, 0 to 5 percent slopes	51,393	0	0	51,393	1.9
AGE	Alamogordo-Gypsum land-Aztec complex, 15 to 50 percent slopes	22,810	0	0	22,810	0.9
AMC	Armesa very fine sandy loam, 0 to 5 percent slopes	18,322	0	0	18,322	0.7
AZF	Aztec-Rock outcrop-Lozier complex, 20 to 65 percent slopes	26,353	0	0	26,353	1.0
BAF	Badland	20,921	0	0	20,921	0.8
BOA	Bluepoint-Onite-Wink association, nearly level	21,157	0	0	21,157	0.8
BRF	Borrego cobbly loam, 15 to 40 percent slopes	0	5,181	0	5,181	0.2
CFA	Crowflats silt loam, 0 to 2 percent slopes	7,456	0	0	7,456	0.3
DEB	Deama gravelly loam, 0 to 5 percent slopes	1,171	3,709	0	4,880	0.2
DEF	Deama gravelly loam, 5 to 30 percent slopes	15,270	2,765	6,624	24,659	0.9
DRF	Deama-Rock outcrop complex, 20 to 50 percent slopes	26,077	40	0	26,117	1.0
DRG	Deama-Rock outcrop complex, 50 to 150 percent slopes	6,432	28,738	365	35,535	1.3
DSF	Deama-Rock outcrop-Holloman Variant complex, 15 to 65 percent slopes	13,834	0	0	13,834	0.5
DTB	Dona Ana-Berino association, gently sloping	9,582	0	0	9,582	0.4
DYE	Dye-Encierro complex, 5 to 30 percent slopes	3,795	25,494	77	29,366	1.1
ECF	Ector-Rock outcrop complex, 20 to 50 percent slopes	117,481	1,000	0	118,481	4.5
ESB	Espy-Shanta Variant association, gently sloping	13,834	0	0	13,834	0.5
GZB	Gypsum land-Holloman complex, 0 to 5 percent slopes	11,472	0	0	11,472	0.4
HOB	Holloman-Gypsum land-Yesum complex, 0 to 5 percent slopes	36,748	0	0	36,748	1.4
HPB	Holloman-Reeves association, nearly level	60,134	0	0	60,134	2.3
JAB	Jal-Tome association, nearly level	21,157	0	0	21,157	0.8
JEC	Jerag-Philder association, gently rolling	19,740	0	0	19,740	0.7
LAB	La Fonda association, gently sloping	2,023	0	0	2,023	0.1
LDB	Largo silt loam, 0 to 3 percent slopes	15,960	0	0	15,960	0.6
LGB	Largo-Ogral complex, 0 to 5 percent slopes	10,527	0	0	10,527	0.4
LOB	Lozier-Rock outcrop complex, 0 to 5 percent slopes	45,298	190	0	45,488	1.7
LOD	Lozier-Rock outcrop complex, 5 to 20 percent slopes	181,965	770	0	182,735	6.9
MEA	Mead silty clay loam, 0 to 1 percent slopes	2,495	0	0	2,495	0.1
MJA	Mimbres-Jal association, nearly level	10,527	0	0	10,527	0.4
MPA	Mimbres-Prelo association, nearly level	8,873	0	0	8,873	0.3
MTA	Mimbres-Tome association, nearly level	105,725	0	0	105,725	4.0
MXC	Montecito loam, 0 to 10 percent slopes	20,787	10,355	4,205	35,347	1.3
NTD	Nickel-Tencee association, strongly sloping	98,314	1,695	109	100,118	3.8
OPB	Onite-Pintura association, gently sloping	6,511	0	0	6,511	0.2
PAE	Pena-Aztec Variant association, strongly sloping	8,637	0	0	8,637	0.3
PCB	Pena-Cale-Kerrick association, nearly level	39,347	0	0	39,347	1.5
PDF	Pena Variant-Rock outcrop association, steep	2,023	0	0	2,023	0.1
PEC	Philder very fine sandy loam, 0 to 9 percent slopes	176,120	0	0	176,120	6.6
PFB	Philder-Armesa association, undulating	31,078	0	0	31,078	1.2
PGB	Pintura-Dona Ana complex, 0 to 5 percent slopes	233,522	0	0	233,522	8.8
PHB	Pintura-Tome-Dona Ana complex, 0 to 5 percent slopes	65,331	0	0	65,331	2.5
POB	Prelo silt loam, 0 to 3 percent slopes	17,614	0	0	17,614	0.7
RAB	Reakor-Tome-Tencee association, gently sloping	207,845	3,000	0	210,845	8.0
REB	Reeves Variant-Shanta association, gently sloping	1,550	0	0	1,550	0.1
RFA	Reyab-Armesa association, gently sloping	70,764	0	0	70,764	2.7
ROG	Rock outcrop, 20 to 65 percent slopes	14,543	0	0	14,543	0.5
RPG	Rock outcrop-Deama complex, 40 to 150 percent slopes	1,075	17,214	0	18,289	0.7
RRF	Rock outcrop-Lozier complex, 20 to 65 percent slopes	366,893	3,966	2,848	373,707	14.1
RTE	Rock outcrop-Tortugas-Ustifluvents complex, 0 to 80 percent slopes	0	12,968	0	12,968	0.5
RUA	Ruidoso association, nearly level	1,314	0	0	1,314	*
SGA	Shanta-Gabaldon association, nearly level	2,968	0	0	2,968	0.1
TAC	Tencee very gravelly silt loam, 0 to 10 percent slopes	33,440	0	0	33,440	1.3
TDB	Tome silt loam, 0 to 5 percent slopes	103,496	0	0	103,496	3.9
TOE	Tortugas cobbly loam, 5 to 30 percent slopes	55,481	16,908	12,173	84,562	3.2
TPE	Tortugas-Deama association, moderately steep	0	11,086	0	11,086	0.4
TPG	Tortugas-Deama association, very steep	0	9,326	0	9,326	0.4
	Total	2,467,185	154,405	26,401	2,647,991	100.0

* Less than 0.1 percent.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE HIGH DETAIL MAP UNITS

Map symbol	Soil name	Otero County	Eddy County	Chaves County	Total-- Area	Total-- Extent
		Acres	Acres	Acres	Acres	Pct
AbB	Alamogordo very fine sandy loam, 0 to 3 percent slopes	3,954	0	0	3,954	4.4
AcA	Alamogordo silt loam, 0 to 1 percent slopes-----------	1,105	0	0	1,105	1.2
AdB	Alamogordo-Aztec complex, 1 to 3 percent slopes-------	5,248	0	0	5,248	5.8
AhB	Alamogordo-McCullough sandy loams, hummocky, 0 to 3 percent slopes-------------------------------------	539	0	0	539	0.6
AkA	Alamogordo Variant very fine sandy loam, 0 to 1 percent slopes-------------------------------------	2,529	0	0	2,529	2.8
AnD	Aztec gravelly fine sandy loam, 3 to 12 percent slopes	2,319	0	0	2,319	2.6
AoB	Aztec-Alamogordo complex, hummocky, 1 to 3 percent slopes--	2,570	0	0	2,570	2.8
Gu	Gullied land--	980	0	0	980	1.1
GyC	Gypsum land, 0 to 9 percent slopes--------------------	2,498	0	0	2,498	2.8
GyE	Gypsum land, 9 to 35 percent slopes-------------------	2,939	0	0	2,939	3.3
HbA	Holloman very fine sandy loam, 0 to 1 percent slopes	2,399	0	0	2,399	2.7
HcA	Holloman-Gypsum land complex, 0 to 1 percent slopes---	3,199	0	0	3,199	3.5
LbB	Largo sandy loam, 1 to 3 percent slopes---------------	782	0	0	782	0.9
LcA	Largo very fine sandy loam, thick surface, 0 to 1 percent slopes-------------------------------------	2,705	0	0	2,705	3.0
LdA	Largo silt loam, 0 to 1 percent slopes----------------	1,544	0	0	1,544	1.7
LdB	Largo silt loam, 1 to 3 percent slopes----------------	1,564	0	0	1,564	1.7
LdB2	Largo silt loam, 1 to 3 percent slopes, eroded--------	1,069	0	0	1,069	1.2
LeA	Largo silt loam, frequent overflow, 0 to 1 percent slopes--	908	0	0	908	1.0
LfB	Largo-Ogral complex, 1 to 3 percent slopes------------	1,941	0	0	1,941	2.2
McB	McCullough sandy loam, 1 to 3 percent slopes----------	2,292	0	0	2,292	2.5
MdA	McCullough Variant very fine sandy loam, 0 to 1 percent slopes-------------------------------------	1,384	0	0	1,384	1.5
NaC	Nickel-Aztec gravelly sandy loams, 2 to 8 percent slopes--	4,452	0	0	4,452	5.0
PkA	Prelo sandy loam, hummocky, 0 to 1 percent slopes-----	2,166	0	0	2,166	2.4
PlA	Prelo fine sandy loam, 0 to 1 percent slopes----------	4,026	0	0	4,026	4.5
PmA	Prelo silt loam, 0 to 1 percent slopes----------------	4,053	0	0	4,053	4.5
PmB	Prelo silt loam, 1 to 3 percent slopes----------------	1,330	0	0	1,330	1.5
PmB2	Prelo silt loam, 1 to 3 percent slopes, eroded--------	557	0	0	557	0.6
PnA	Prelo silt loam, hummocky, 0 to 1 percent slopes------	5,105	0	0	5,105	5.7
PpA	Prelo silt loam, frequent overflow, 0 to 1 percent slopes--	1,069	0	0	1,069	1.2
PvB	Prelo-Prelo Variant complex, 0 to 3 percent slopes----	719	0	0	719	0.8
RbA	Reeves very fine sandy loam, 0 to 1 percent slopes----	1,806	0	0	1,806	2.0
RcB2	Reeves very fine sandy loam, 0 to 2 percent slopes, eroded---	512	0	0	512	0.6
RdA	Reeves very fine sandy loam, frequent overflow, 0 to 1 percent slopes-------------------------------------	297	0	0	297	0.3
TbA	Tobler silt loam, 0 to 1 percent slopes---------------	350	0	0	350	0.4
TcA	Tome very fine sandy loam, 0 to 1 percent slopes------	4,817	0	0	4,817	5.4
TcB	Tome very fine sandy loam, 1 to 3 percent slopes, eroded---	1,294	0	0	1,294	1.4
TeB	Tome silt loam, frequent overflow, 1 to 3 percent slopes--	3,720	0	0	3,720	4.1
TfB	Tome-Emot complex, 0 to 3 percent slopes--------------	3,783	0	0	3,783	4.2
TvA	Torrifluvents, hummocky, 0 to 1 percent slopes--------	2,040	0	0	2,040	2.3
UaA	Ustic Torriorthents, frequent overflow, 0 to 1 percent slopes--	863	0	0	863	1.0
	Dumps--	1,060	0	0	1,060	1.2
	Made land--------------------------------------	144	0	0	144	0.2
	Pits, borrow-----------------------------------	171	0	0	171	0.2
	Pits, gravel-----------------------------------	638	0	0	638	0.7
	Riverwash--------------------------------------	431	0	0	431	0.5
	Total------------------------------------	89,871	0	0	89,871	100.0

TABLE 5.--YIELDS PER ACRE OF IRRIGATED CROPS AND PASTURE

[All yields were estimated for a high level of management. Absence of a yield figure indicates the crop is seldom grown or is not suited]

Soil name and map symbol	Alfalfa hay	Barley	Cotton lint	Grain sorghum	Pasture	Wheat
	Ton	Bu	Lb	Bu	AUM*	Bu
AbB: Alamogordo	---	---	---	---	---	---
AcA: Alamogordo	---	---	---	---	8	---
AdB: Alamogordo	---	---	---	---	---	---
AhB: Alamogordo	---	---	---	---	---	---
AkA: Alamogordo Variant	6	70	875	95	12	60
AnD: Aztec	---	---	---	---	---	---
AoB: Aztec	---	---	---	---	---	---
Gu**. Gullied land						
GyC**, GyE**. Gypsum land						
HbA: Holloman	4	60	625	45	11	---
HcA: Holloman	---	---	---	---	---	---
LbB: Largo	7	87	---	---	14	---
LcA: Largo	9	85	1,000	110	17	75
LdA, LdB***, LdB2***. Largo						
LeA: Largo	---	---	---	---	---	---
LfB***: Largo	---	---	---	---	---	---
McB: McCullough	6.5	75	850	95	12	55
MdA: McCullough Variant	7	90	1,200	110	12	60
NaC: Nickel	---	---	---	---	---	---
PkA, PlA: Prelo	8	70	900	95	15	60
PmA: Prelo	9	85	1,000	110	17	75

See footnotes at end of table.

TABLE 5.--YIELDS PER ACRE OF IRRIGATED CROPS AND PASTURE--Continued

Soil name and map symbol	Alfalfa hay	Barley	Cotton lint	Grain sorghum	Pasture	Wheat
	Ton	Bu	Lb	Bu	AUM*	Bu
PmB, PmB2: Prelo	8	75	950	95	15	65
PnA, PpA: Prelo	9	85	1,000	110	17	75
PvB: Prelo	7	75	933	90	14	60
RbA: Reeves	6	70	875	95	12	---
RcB2: Reeves	4.5	60	750	85	9	---
RdA: Reeves	---	---	---	---	---	---
TbA: Tobler	8	75	---	---	14	---
TcA***: Tome	8	95	1,200	120	15	---
TcB, TeB: Tome	7	70	1,000	110	13	---
TfB***: Tome	7	68	900	98	12	---
TvA**. Torrifluvents						
UaA**. Ustic Torriorthents.						

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for a period of 30 days.
** See map unit description for the composition and behavior of the map unit.
*** Yields are for areas protected from flooding.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES

[Soils not listed do not support rangeland vegetation suited to grazing]

Soil name and map symbol	Range site and land resource area	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Compo- sition
			Lb/acre		Pct
AEC*:					
Alamogordo	Gyp SD-2	Favorable	550	Gyp grama	20
		Normal	400	Hairy coldenia	15
		Unfavorable	250	Alkali sacaton	10
				Gyp dropseed	10
				Black grama	5
				Threeawn	5
				Fourwing saltbush	5
				Nevada Mormon-tea	5
				Tobosa	5
				Burrograss	5
Gypsum land.					
AGE*:					
Alamogordo	Gyp SD-2	Favorable	550	Gyp grama	20
		Normal	400	Hairy coldenia	15
		Unfavorable	250	Alkali sacaton	10
				Gyp dropseed	10
				Black grama	5
				Threeawn	5
				Fourwing saltbush	5
				Nevada Mormon-tea	5
				Tobosa	5
				Burrograss	5
Gypsum land.					
Aztec	Gyp SD-2	Favorable	650	Black grama	15
		Normal	450	Gyp grama	15
		Unfavorable	250	Gyp dropseed	10
				Hairy coldenia	10
				Tobosa	9
				Fourwing saltbush	6
				Bush muhly	5
				Arizona cottontop	5
				Mesa dropseed	5
				Nevada Mormon-tea	5
				Creosotebush	5
AMC Armesa	Limy SD-3	Favorable	1,450	Black grama	40
		Normal	1,350	Blue grama	10
		Unfavorable	900	Threeawn	10
				Sand dropseed	5
				Winterfat	5
AZF*:					
Aztec	Gyp SD-2	Favorable	650	Black grama	15
		Normal	450	Gyp grama	15
		Unfavorable	250	Gyp dropseed	10
				Hairy coldenia	10
				Tobosa	9
				Fourwing saltbush	6
				Bush muhly	5
				Arizona cottontop	5
				Mesa dropseed	5
				Nevada Mormon-tea	5
				Creosotebush	5
Rock outcrop.					
Lozier	Limestone hills SD-2	Favorable	650	Black grama	25
		Normal	450	Gyp grama	15
		Unfavorable	250	Slim tridens	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site and land resource area	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Compo-sition
			Lb/acre		Pct
BOA*:					
Bluepoint	Deep Sand SD-2	Favorable	900	Spike dropseed	15
		Normal	600	Mesa dropseed	15
		Unfavorable	300	Bush muhly	10
				Fourwing saltbush	10
				Black grama	5
				Giant dropseed	15
				Arizona cottontop	5
Onite	Sandy SD-2	Favorable	650	Black grama	25
		Normal	450	Bush muhly	15
		Unfavorable	250	Mesa dropseed	15
				Sand dropseed	10
				Plains bristlegrass	5
				Threeawn	5
				Soaptree yucca	5
				Broom snakeweed	5
Wink	Sandy SD-2	Favorable	750	Black grama	20
		Normal	550	Bush muhly	20
		Unfavorable	250	Spike dropseed	5
				Mesa dropseed	5
				Sand dropseed	5
				Plains bristlegrass	5
				Arizona cottontop	5
				Blue grama	5
BRF Borrego	Ponderosa pine	Favorable	1,100	Blue grama	20
		Normal	800	Mountain muhly	15
		Unfavorable	600	Arizona fescue	10
				Prairie junegrass	10
				Pine dropseed	10
				Bottlebrush squirreltail	5
				Pinyon pine	5
				Oneseed juniper	5
				Gambel oak	5
				True mountainmahogany	5
CFA Crowflats	Bottomland SD-2	Favorable	2,000	Giant sacaton	35
		Normal	1,800	Alkali sacaton	10
		Unfavorable	1,000	Tobosa	10
				Cane bluestem	5
				Twoflower trichloris	5
				Arizona cottontop	5
				Broom baccharis	5
				American tarbush	5
				Mesquite	5
DEB, DEF Deama	Juniper-pinyon	Favorable	1,200	Sideoats grama	25
		Normal	900	Black grama	15
		Unfavorable	500	Blue grama	10
				Metcalfe muhly	10
				Mariola	7
				Plains lovegrass	5
DRF*:					
Deama	Limestone Hills CP-4	Favorable	1,200	Sideoats grama	25
		Normal	900	Black grama	15
		Unfavorable	500	Blue grama	10
				Metcalfe muhly	10
				Mariola	7
				Plains lovegrass	5
Rock outcrop.					

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site and land resource area	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
DRG*:					
Deama	Juniper-pinyon	Favorable	1,200	Sideoats grama	25
		Normal	900	Black grama	15
		Unfavorable	500	Blue grama	10
				Metcalfe muhly	10
				Mariola	7
				Plains lovegrass	5
Rock outcrop.					
DSF*:					
Deama	Limestone hills CP-4	Favorable	1,200	Sideoats grama	25
		Normal	900	Black grama	15
		Unfavorable	500	Blue grama	10
				Metcalfe muhly	10
				Mariola	7
				Plains lovegrass	5
Rock outcrop.					
Holloman Variant	Limestone hills CP-4	Favorable	1,200	Sideoats grama	20
		Normal	1,100	Black grama	15
		Unfavorable	800	Green needlegrass	10
				New Mexico feathergrass	10
				Wolftail	5
				Plains lovegrass	5
				Threeawn	5
				Metcalfe muhly	5
				Blue grama	5
DTB*:					
Dona Ana	Sandy SD-2	Favorable	600	Black grama	28
		Normal	350	Bush muhly	20
		Unfavorable	250	Mesa dropseed	10
				Sand dropseed	10
				Soaptree yucca	5
				Broom snakeweed	5
				Fourwing saltbush	5
Berino	Sandy SD-2	Favorable	600	Black grama	25
		Normal	350	Bush muhly	20
		Unfavorable	250	Mesa dropseed	10
				Sand dropseed	10
				Sideoats grama	5
				Hairy grama	5
				Soaptree yucca	5
				Plains bristlegrass	5
				Threeawn	5
DYE*:					
Dye	Juniper-pinyon	Favorable	1,000	Blue grama	20
		Normal	500	Oneseed juniper	18
		Unfavorable	300	Sideoats grama	15
				Western wheatgrass	10
				Pinyon pine	10
				Bottlebrush squirreltail	5
				Black grama	5
				Metcalfe muhly	5
				Winterfat	5
Encierro.					
ECF*:					
Ector	Limestone hills CP-4	Favorable	850	Sideoats grama	25
		Normal	550	Black grama	15
		Unfavorable	350	Blue grama	10
				Metcalfe muhly	10
				Green sprangletop	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site and land resource area	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
ECF*:					
Rock outcrop.					
ESB*:					
Espy	Shallow CP-4	Favorable	1,200	Black grama	25
		Normal	1,000	Blue grama	25
		Unfavorable	600	Sideoats grama	10
				Cane bluestem	10
				Green sprangletop	6
				Plains bristlegrass	6
				Tobosa	5
Shanta Variant	Loamy CP-4	Favorable	---	Sideoats grama	15
		Normal	---	Blue grama	15
		Unfavorable	---	Black grama	15
				Threeawn	10
				Tobosa	5
				Sand dropseed	5
				Burrograss	5
				Silver bluestem	5
GZB*:					
Gypsum land.					
Holloman	Gyp SD-2	Favorable	600	Gyp grama	25
		Normal	450	Alkali sacaton	20
		Unfavorable	250	Burrograss	15
				Coldenia	15
				Tobosa	5
				Mormon-tea	5
				Fourwing saltbush	5
HOB*:					
Holloman	Loamy SD-3	Favorable	750	Alkali sacaton	20
		Normal	550	Burrograss	20
		Unfavorable	300	Tobosa	15
				Blue grama	15
				Sand dropseed	7
				Nevada Mormon-tea	5
				Fourwing saltbush	5
				Vine-mesquite	5
Gypsum land.					
Yesum	Gyp SD-2	Favorable	550	Gyp grama	25
		Normal	400	Hairy coldenia	20
		Unfavorable	200	Alkali sacaton	15
				Gyp dropseed	10
				Fourwing saltbush	7
				Bush muhly	5
				Nevada Mormon-tea	5
HPB*:					
Holloman	Loamy SD-3	Favorable	750	Alkali sacaton	20
		Normal	550	Burrograss	20
		Unfavorable	300	Tobosa	15
				Blue grama	15
				Sand dropseed	7
				Nevada Mormon-tea	5
				Fourwing saltbush	5
				Vine-mesquite	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site and land resource area	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
HPB*:					
Reeves	Loamy SD-3	Favorable	800	Blue grama	20
		Normal	500	Tobosa	15
		Unfavorable	300	Burrograss	10
				Alkali sacaton	10
				Sideoats grama	10
				Winterfat	5
				Broom snakeweed	5
				Black grama	5
JAB*:					
Jal	Limy SD-2	Favorable	1,000	Black grama	12
		Normal	700	Sideoats grama	10
		Unfavorable	475	Alkali sacaton	10
				Small soapweed	10
				Burrograss	10
				Tobosa	10
				Blue grama	8
				Fourwing saltbush	5
				Bush muhly	5
				Vine-mesquite	5
				Winterfat	5
				Threeawn	5
				Nevada Mormon-tea	5
Tome	Loamy SD-2	Favorable	600	Black grama	20
		Normal	300	Bush muhly	15
		Unfavorable	175	Burrograss	15
				Alkali sacaton	10
				Tobosa	10
				Blue grama	5
				Winterfat	5
				Sand dropseed	5
				Threeawn	5
				Broom snakeweed	5
JEC*:					
Jerag	Shallow sandy SD-3	Favorable	1,000	Black grama	55
		Normal	900	Blue grama	10
		Unfavorable	600	Bush muhly	5
Philder	Shallow sandy SD-3	Favorable	1,000	Black grama	60
		Normal	900	Blue grama	5
		Unfavorable	600	Bush muhly	5
Armesa	Limy SD-3	Favorable	1,450	Black grama	40
		Normal	1,350	Blue grama	10
		Unfavorable	900	Threeawn	10
				Sand dropseed	5
				Winterfat	5
LAB* La Fonda	Loamy CP-4	Favorable	1,300	Blue grama	30
		Normal	700	Western wheatgrass	15
		Unfavorable	300	Galleta	15
				Sideoats grama	10
				Indian ricegrass	5
				Little bluestem	5
				Fourwing saltbush	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site and land resource area	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
LDB: Largo	Loamy SD-2	Favorable	850	Tobosa	20
		Normal	600	Alkali sacaton	15
		Unfavorable	400	Burrograss	10
				Blue grama	10
				Cane bluestem	5
				Twoflower trichloris	5
				Arizona cottontop	5
				Black grama	5
				Sideoats grama	5
				Leatherweed croton	5
				Globemallow	5
LGB*:					
Largo	Loamy SD-2	Favorable	850	Tobosa	20
		Normal	600	Alkali sacaton	15
		Unfavorable	400	Burrograss	10
				Blue grama	10
				Cane bluestem	5
				Twoflower trichloris	5
				Arizona cottontop	5
				Black grama	5
				Sideoats grama	5
				Leatherweed croton	5
				Globemallow	5
Ogral	Loamy SD-2	Favorable	800	Alkali sacaton	10
		Normal	650	Tobosa	10
		Unfavorable	400	Black grama	10
				Burrograss	10
				Twoflower trichloris	10
				Bush muhly	10
				Vine-mesquite	5
				Threeawn	5
				Arizona cottontop	5
				Creosotebush	5
				American tarbush	5
LOB*:					
Lozier	Gravelly SD-2	Favorable	500	Black grama	30
		Normal	350	Gyp grama	15
		Unfavorable	125	Slim tridens	5
Rock outcrop.					
LOD*:					
Lozier	Limestone hills SD-2	Favorable	650	Black grama	25
		Normal	450	Gyp grama	15
		Unfavorable	250	Slim tridens	5
Rock outcrop.					
MEA: Mead	Saline lowland SD-2	Favorable	100	Alkali sacaton	50
		Normal	50	Iodinebush	40
		Unfavorable	25		
MJA*:					
Mimbres	Loamy SD-2	Favorable	700	Tobosa	35
		Normal	450	Black grama	20
		Unfavorable	175	Sideoats grama	10
				Alkali sacaton	5
				Burrograss	5
				Threeawn	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site and land resource area	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
MJA*:					
Jal	Limy SD-2	Favorable	1,000	Black grama	12
		Normal	700	Sideoats grama	10
		Unfavorable	475	Alkali sacaton	10
				Small soapweed	10
				Burrograss	10
				Tobosa	10
				Blue grama	8
				Fourwing saltbush	5
				Bush muhly	5
				Vine-mesquite	5
				Winterfat	5
				Threeawn	5
				Nevada Mormon-tea	5
MPA*:					
Mimbres	Loamy SD-2	Favorable	700	Tobosa	35
		Normal	450	Black grama	20
		Unfavorable	175	Sideoats grama	10
				Alkali sacaton	5
				Burrograss	5
				Threeawn	5
Prelo	Loamy SD-2	Favorable	800	Burrograss	20
		Normal	650	Threeawn	15
		Unfavorable	400	Twoflower trichloris	15
				Bush muhly	15
				American tarbush	15
				Tobosa	10
				Alkali sacaton	5
				Cane bluestem	5
MTA*:					
Mimbres	Loamy SD-2	Favorable	700	Tobosa	35
		Normal	450	Black grama	20
		Unfavorable	175	Sideoats grama	10
				Alkali sacaton	5
				Burrograss	5
				Threeawn	5
Tome	Loamy SD-2	Favorable	600	Black grama	20
		Normal	300	Bush muhly	15
		Unfavorable	175	Burrograss	15
				Alkali sacaton	10
				Tobosa	10
				Blue grama	5
				Winterfat	5
				Sand dropseed	5
				Threeawn	5
				Broom snakeweed	5
MXC Montecito	Pinyon-juniper	Favorable	350	Blue grama	20
		Normal	250	Big sagebrush	20
		Unfavorable	150	Broom snakeweed	10
				Sideoats grama	10
				Bottlebrush squirreltail	10
				Muttongrass	10
				Sand dropseed	5
				Gambel oak	5
				Banana yucca	5
				Plains pricklypear	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site and land resource area	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
NTD*:					
Nickel	Gravelly SD-2	Favorable	500	Black grama	30
		Normal	350	Bush muhly	10
		Unfavorable	125	Creosotebush	10
				Arizona cottontop	5
				Cane bluestem	5
				Plains bristlegrass	5
				Mesa dropseed	5
				Alkali sacaton	5
				Catclaw mimosa	5
				Winterfat	5
				Nevada Mormon-tea	5
				Soaptree yucca	5
Tencee	Gravelly SD-2	Favorable	500	Black grama	20
		Normal	350	Bush munly	10
		Unfavorable	125	Creosotebush	10
				Tobosa	5
				Sand dropseed	5
				Fluffgrass	5
				Burrograss	5
				Broom snakeweed	5
				Buckwheat	5
OPB*:					
Onite	Sandy SD-2	Favorable	650	Black grama	25
		Normal	450	Bush muhly	15
		Unfavorable	250	Mesa dropseed	15
				Sand dropseed	10
				Plains bristlegrass	5
				Threeawn	5
				Soaptree yucca	5
				Broom snakeweed	5
Pintura	Deep sand SD-2	Favorable	900	Giant dropseed	15
		Normal	600	Mesa dropseed	15
		Unfavorable	300	Bush muhly	10
				Threeawn	10
				Sand sagebrush	10
				Plains bristlegrass	5
				Soaptree yucca	5
				Fourwing saltbush	5
				Nevada Mormon-tea	5
PAE*:					
Pena	Hills CP-4	Favorable	1,600	Sideoats grama	20
		Normal	1,000	Black grama	15
		Unfavorable	600	Blue grama	10
				Threeawn	10
				Plains lovegrass	10
				Oneseed juniper	5
Aztec Variant	Gyp CP-4	Favorable	1,400	Black grama	20
		Normal	850	Sideoats grama	15
		Unfavorable	600	Alkali sacaton	10
				Green needlegrass	8
				Blue grama	8
				New Mexico feathergrass	5
				Threeawn	5
				Hairy coldenia	5
				Mesa dropseed	5
				Oneseed juniper	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site and land resource area	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
PCB*:					
Pena	Shallow CP-4	Favorable	1,600	Sideoats grama	20
		Normal	1,000	Black grama	15
		Unfavorable	600	Blue grama	10
				Threeawn	10
				Plains lovegrass	10
				Oneseed juniper	5
Cale	Loamy CP-4	Favorable	1,350	Western wheatgrass	15
		Normal	1,200	Green needlegrass	5
		Unfavorable	900		
Kerrick	Shallow CP-4	Favorable	2,100	Sideoats grama	35
		Normal	1,700	Blue grama	25
		Unfavorable	1,300	Vine-mesquite	5
				Buffalograss	5
				Silver bluestem	5
				Sand dropseed	5
PDF*:					
Pena Variant	Hills CP-4	Favorable	1,500	Black grama	25
		Normal	1,200	Sideoats grama	20
		Unfavorable	800	Metcalfe muhly	15
				Threeawn	10
				Tobosa	10
				Blue grama	10
				Bush muhly	5
				Apacheplume	5
Rock outcrop.					
PEC	Shallow sandy SD-3	Favorable	1,000	Black grama	60
Philder		Normal	900	Blue grama	5
		Unfavorable	600	Bush muhly	5
PFB*:					
Philder	Shallow sandy SD-3	Favorable	1,000	Black grama	60
		Normal	900	Blue grama	5
		Unfavorable	600	Bush muhly	5
Armesa	Limy SD-3	Favorable	1,450	Black grama	40
		Normal	1,350	Blue grama	10
		Unfavorable	900	Threeawn	10
				Sand dropseed	5
				Winterfat	5
PGB*:					
Pintura	Deep sand SD-2	Favorable	900	Giant dropseed	15
		Normal	600	Mesa dropseed	15
		Unfavorable	300	Bush muhly	10
				Threeawn	10
				Sand sagebrush	10
				Plains bristlegrass	5
				Soaptree yucca	5
				Fourwing saltbush	5
				Nevada Mormon-tea	5
Dona Ana	Sandy SD-2	Favorable	600	Black grama	28
		Normal	350	Bush muhly	20
		Unfavorable	250	Mesa dropseed	10
				Sand dropseed	10
				Soaptree yucca	5
				Broom snakeweed	5
				Fourwing saltbush	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site and land resource area	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
PHB*:					
Pintura	Deep sand SD-2	Favorable	900	Giant dropseed	15
		Normal	600	Mesa dropseed	15
		Unfavorable	300	Bush muhly	10
				Threeawn	10
				Sand sagebrush	10
				Plains bristlegrass	5
				Soaptree yucca	5
				Fourwing saltbush	5
				Nevada Mormon-tea	5
Tome	Draw SD-2	Favorable	950	Tobosa	40
		Normal	800	Alkali sacaton	20
		Unfavorable	500	Bush muhly	5
				Blue grama	5
				Winterfat	5
				Burrograss	5
				Sand dropseed	5
				Threeawn	5
				Broom snakeweed	5
Dona Ana	Sandy SD-2	Favorable	600	Black grama	28
		Normal	350	Bush muhly	20
		Unfavorable	250	Mesa dropseed	10
				Sand dropseed	10
				Soaptree yucca	5
				Broom snakeweed	5
				Fourwing saltbush	5
POB Prelo	Loamy SD-2	Favorable	800	Burrograss	20
		Normal	650	Threeawn	15
		Unfavorable	400	Twoflower trichloris	15
				Bush muhly	15
				American tarbush	15
				Tobosa	10
				Alkali sacaton	5
				Cane bluestem	5
RAB*:					
Reakor	Loamy SD-2	Favorable	800	Tobosa	15
		Normal	500	Blue grama	15
		Unfavorable	300	Sideoats grama	15
				Black grama	15
				Burrograss	10
				Alkali sacaton	5
				Sand dropseed	5
				Broom snakeweed	5
				Soaptree yucca	5
Tome	Loamy SD-2	Favorable	600	Black grama	20
		Normal	300	Bush muhly	15
		Unfavorable	175	Burrograss	15
				Alkali sacaton	10
				Tobosa	10
				Blue grama	5
				Winterfat	5
				Sand dropseed	5
				Threeawn	5
				Broom snakeweed	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site and land resource area	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
RAB*:					
Tencee	Gravelly SD-2	Favorable	500	Black grama	20
		Normal	350	Bush muhly	10
		Unfavorable	125	Creosotebush	10
				Tobosa	5
				Sand dropseed	5
				Fluffgrass	5
				Burrograss	5
				Broom snakeweed	5
				Buckwheat	5
REB*:					
Reeves Variant	Loamy CP-4	Favorable	1,250		
		Normal	950		
		Unfavorable	650		
Shanta	Loamy CP-4	Favorable	1,250	Blue grama	25
		Normal	950	Alkali sacaton	10
		Unfavorable	650	Sideoats grama	10
				Tobosa	10
				Black grama	10
				Silver bluestem	5
				Halls panicum	5
				Fourwing saltbush	5
				Winterfat	5
				Apacheplume	5
				Burrograss	5
RFA*:					
Reyab	Draw SD-3	Favorable	2,000	Tobosa	25
		Normal	1,700	Alkali sacaton	15
		Unfavorable	1,100	White tridens	13
				Sideoats grama	10
				Cane bluestem	10
				Twoflower trichloris	5
				Arizona cottontop	5
				Plains bristlegrass	5
				Vine-mesquite	5
Armesa	Limy SD-3	Favorable	1,450	Black grama	40
		Normal	1,350	Blue grama	10
		Unfavorable	900	Threeawn	10
				Sand dropseed	5
				Winterfat	5
RPG*:					
Rock outcrop.					
Deama	Juniper-pinyon	Favorable	1,000	Metcalfe muhly	20
		Normal	500	Sideoats grama	15
		Unfavorable	200	Blue grama	15
				Black grama	10
				Little bluestem	5
RRF*:					
Rock outcrop.					
Lozier	Limestone hills SD-2	Favorable	650	Black grama	25
		Normal	450	Gyp grama	15
		Unfavorable	250	Slim tridens	5
RTE*:					
Rock outcrop.					

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site and land resource area	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
RTE*:					
Tortugas	Pinyon-juniper	Favorable	1,200	Sideoats grama	15
		Normal	800	Plains lovegrass	15
		Unfavorable	600	Black grama	10
				Silver beardgrass	7
				Wooly bunchgrass	5
				Sideflower crinkleawn	5
				Hairy grama	5
				Curlymesquite	5
				False-mesquite	5
				Stansbury cliffrose	5
				Emory oak	5
Ustifluvents.					
RUA*:					
Ruidoso	Loamy CP-4	Favorable	1,200	Blue grama	25
		Normal	1,050	Alkali sacaton	10
		Unfavorable	650	Sideoats grama	10
				Tobosa	10
				Black grama	5
				Plains lovegrass	5
				Silver bluestem	5
				Halls panicum	5
				Fourwing saltbush	5
				Winterfat	5
				Apacheplume	5
SGA*:					
Shanta	Bottomland CP-4	Favorable	2,500	Tobosa	25
		Normal	2,000	Giant sacaton	15
		Unfavorable	750	Sideoats grama	10
				Alkali sacaton	10
				Vine-mesquite	5
				Red muhly	5
				Apacheplume	5
				Brickellbush	5
				Littleleaf sumac	5
				Blue grama	5
Gabaldon	Bottomland CP-4	Favorable	2,500	Tobosa	25
		Normal	2,000	Sideoats grama	15
		Unfavorable	750	Halls panicum	10
				Red muhly	10
				Blue grama	5
				Threeawn	5
				Littleleaf sumac	5
				California Brickellbush	5
				Vine-mesquite	5
				Apacheplume	5
TAC: Tencee	Gravelly SD-2	Favorable	500	Black grama	20
		Normal	350	Bush muhly	10
		Unfavorable	125	Creosotebush	10
				Tobosa	5
				Sand dropseed	5
				Fluffgrass	5
				Burrograss	5
				Broom snakeweed	5
				Buckwheat	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site and land resource area	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
TDB----------------Tome	Loamy SD-2	Favorable	600	Black grama	20
		Normal	300	Bush muhly	15
		Unfavorable	175	Burrograss	15
				Alkali sacaton	10
				Tobosa	10
				Blue grama	5
				Winterfat	5
				Sand dropseed	5
				Threeawn	5
				Broom snakeweed	5
TOE----------------Tortugas	Pinyon-juniper	Favorable	1,200	Sideoats grama	15
		Normal	800	Plains lovegrass	15
		Unfavorable	600	Black grama	10
				Silver beardgrass	7
				Wooly bunchgrass	5
				Sideflower crinkleawn	5
				Hairy grama	5
				Curlymesquite	5
				False-mesquite	5
				Stansbury cliffrose	5
				Emory oak	5
TPE*:					
Tortugas	Pinyon-juniper	Favorable	1,200	Sideoats grama	15
		Normal	800	Plains lovegrass	15
		Unfavorable	600	Black grama	10
				Silver beardgrass	7
				Wooly bunchgrass	5
				Sideflower crinkleawn	5
				Hairy grama	5
				Curlymesquite	5
				False-mesquite	5
				Stansbury cliffrose	5
				Emory oak	5
Deama	Juniper-pinyon	Favorable	1,200	Sideoats grama	25
		Normal	900	Black grama	15
		Unfavorable	500	Blue grama	10
				Metcalfe muhly	10
				Mariola	7
				Plains lovegrass	5
TPG*:					
Tortugas	Pinyon-juniper	Favorable	1,200	Sideoats grama	15
		Normal	800	Plains lovegrass	15
		Unfavorable	600	Black grama	10
				Silver beardgrass	7
				Wooly bunchgrass	5
				Sideflower crinkleawn	5
				Hairy grama	5
				Curlymesquite	5
				False-mesquite	5
				Stansbury cliffrose	5
				Emory oak	5
Deama	Juniper-pinyon	Favorable	1,000	Metcalfe muhly	20
		Normal	500	Sideoats grama	15
		Unfavorable	200	Blue grama	15
				Black grama	10
				Little bluestem	5

* See map unit description for the composition and behavior of the map unit.

TABLE 7.--BUILDING SITE DEVELOPMENT ON LOW DETAIL MAP UNITS

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry means soil was not rated]

Soil name an map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
AEC*:					
Alamogordo	Slight	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.
Gypsum land.					
AGE*:					
Alamogordo	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Gypsum land.					
Aztec	Severe: slope, small stones.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
AMC Armesa	Slight	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: low strength, shrink-swell.
AZF*:					
Aztec	Severe: slope, small stones.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.					
Lozier	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
BAF*. Badland					
BOA*:					
Bluepoint	Severe: cutbanks cave.	Slight	Slight	Slight	Slight.
Onite	Slight	Slight	Slight	Slight	Slight.
Wink	Slight	Slight	Slight	Slight	Slight.
BRF Borrego	Severe: slope, depth to rock.	Severe: slope, depth to rock, shrink-swell.	Severe: slope, depth to rock, shrink-swell.	Severe: slope, depth to rock, shrink-swell.	Severe: slope, depth to rock, shrink-swell.
CFA Crowflats	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
DEB Deama	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
DEF Deama	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
DRF*, DRG*:					
Deama	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
Rock outcrop.					

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT ON LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
DSF*:					
Deama	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
Rock outcrop.					
Holloman Variant	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
DTB*:					
Dona Ana	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, low strength.
Berino	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, low strength.
DYE*:					
Dye	Severe: depth to rock, too clayey, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: depth to rock, shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: depth to rock, slope, shrink-swell.
Encierro	Severe: depth to rock.	Severe: depth to rock, shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: depth to rock, shrink-swell, slope.	Severe: depth to rock, shrink-swell, low strength.
ECF*:					
Ector	Severe: slope, depth to rock, small stones.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.
Rock outcrop.					
ESB*:					
Espy	Moderate: cemented pan.	Moderate: cemented pan, shrink-swell.	Moderate: cemented pan, shrink-swell.	Moderate: cemented pan, shrink-swell.	Moderate: cemented pan, shrink-swell.
Shanta Variant	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, low strength.
GZB*:					
Gypsum land.					
Holloman	Moderate: depth to rock.	Moderate: depth to rock, low strength.	Severe: depth to rock.	Moderate: depth to rock, low strength.	Moderate: depth to rock, low strength.
HOB*:					
Holloman	Moderate: depth to rock.	Moderate: depth to rock, low strength.	Severe: depth to rock.	Moderate: depth to rock, low strength.	Moderate: depth to rock, low strength.
Gypsum land.					
Yesum	Slight	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.
HPB*:					
Holloman	Moderate: depth to rock.	Moderate: depth to rock, low strength.	Severe: depth to rock.	Moderate: depth to rock, low strength.	Moderate: depth to rock, low strength.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT ON LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
HPB*:					
Reeves	Slight	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.
JAB*:					
Jal	Slight	Slight	Slight	Slight	Moderate: low strength.
Tome	Moderate: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: shrink-swell, floods, low strength.
JEC*:					
Jerag	Moderate: cemented pan.	Moderate: cemented pan.	Moderate: cemented pan.	Moderate: cemented pan.	Moderate: cemented pan, low strength.
Philder	Moderate: cemented pan.	Moderate: cemented pan.	Moderate: cemented pan.	Moderate: cemented pan.	Moderate: cemented pan.
Armesa	Slight	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: low strength, shrink-swell.
LAB* La Fonda	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, low strength.
LDB Largo	Moderate: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods, shrink-swell, low strength.
LGB*:					
Largo	Moderate: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods, shrink-swell, low strength.
Ogral	Severe: small stones.	Slight	Slight	Slight	Slight.
LOB*:					
Lozier	Severe: depth to rock, small stones.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Rock outcrop.					
LOD*:					
Lozier	Severe: depth to rock, small stones.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.
Rock outcrop.					
MEA Mead	Severe: too clayey, floods.	Severe: floods, low strength, shrink-swell.	Severe: floods, wetness, low strength, shrink-swell.	Severe: floods, low strength, shrink-swell.	Severe: floods, low strength, shrink-swell.
MJA*:					
Mimbres	Moderate: floods, too clayey.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: low strength.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT ON LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
MJA*:					
Jal	Slight	Slight	Slight	Slight	Moderate: low strength.
MPA*:					
Mimbres	Moderate: floods, too clayey.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: low strength.
Prelo	Slight	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: low strength.
MTA*:					
Mimbres	Moderate: floods, too clayey.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: low strength.
Tome	Moderate: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: shrink-swell, floods, low strength.
MXC Montecito	Moderate: too clayey.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.
NTD*:					
Nickel	Severe: small stones.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
Tencee	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan, slope.	Severe: cemented pan.
OPB*:					
Onite	Slight	Slight	Slight	Slight	Slight.
Pintura	Severe: cutbanks cave.	Slight	Slight	Slight	Slight.
PAE*:					
Pena	Moderate: slope, small stones.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.
Aztec Variant	Severe: slope, small stones.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
PCB*:					
Pena	Moderate: small stones.	Slight	Slight	Slight	Moderate: frost action.
Cale	Slight	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength, frost action.
Kerrick	Severe: cemented pan.	Moderate: cemented pan, low strength.	Severe: cemented pan.	Moderate: cemented pan, low strength.	Moderate: low strength.
PDF*:					
Pena Variant	Severe: slope, cutbanks cave, small stones.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT ON LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
PDF*:					
Rock outcrop.					
PEC---------------- Philder	Moderate: cemented pan.	Moderate: cemented pan.	Moderate: cemented pan.	Moderate: cemented pan, slope.	Moderate: cemented pan.
PFB*:					
Philder-----------	Moderate: cemented pan.	Moderate: cemented pan.	Moderate: cemented pan.	Moderate: cemented pan.	Moderate: cemented pan.
Armesa------------	Slight-----------	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: low strength, shrink-swell.
PGB*:					
Pintura-----------	Severe: cutbanks cave.	Slight-----------	Slight-----------	Slight------------	Slight.
Dona Ana----------	Slight-----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, low strength.
PHB*:					
Pintura-----------	Severe: cutbanks cave.	Slight-----------	Slight-----------	Slight------------	Slight.
Tome--------------	Moderate: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: shrink-swell, floods, low strength.
Dona Ana----------	Slight-----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, low strength.
POB---------------- Prelo	Slight-----------	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: low strength.
RAB*:					
Reakor------------	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, shrink-swell.
Tome--------------	Moderate: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: shrink-swell, floods, low strength.
Tencee------------	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.
REB*:					
Reeves Variant----	Slight-----------	Slight-----------	Moderate: shrink-swell.	Slight------------	Moderate: shrink-swell, low strength.
Shanta------------	Slight-----------	Moderate: shrink-swell, low strength.	Moderate: shrink-swell.	Moderate: shrink-swell, low strength.	Moderate: low strength, frost action, shrink-swell.
RFA*:					
Reyab-------------	Moderate: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods, shrink-swell, low strength.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT ON LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
RFA*:					
Armesa	Slight	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: low strength, shrink-swell.
ROG*. Rock outcrop					
RPG*: Rock outcrop.					
Deama	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
RRF*: Rock outcrop.					
Lozier	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
RTE*: Rock outcrop.					
Tortugas	Severe: depth to rock, slope, small stones.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.
Ustifluvents.					
RUA*:					
Ruidoso	Moderate: too clayey.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.
SGA*:					
Shanta	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods, low strengtn.
Gabaldon	Moderate: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: low strength, floods, shrink-swell.
TAC Tencee	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.
TDB Tome	Moderate: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: shrink-swell, floods, low strength.
TOE Tortugas	Severe: depth to rock, slope, small stones.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.
TPE*, TPG*:					
Tortugas	Severe: depth to rock, slope, small stones.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.
Deama	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.

* See map unit description for the composition and behavior of the map unit.

TABLE 8.--BUILDING SITE DEVELOPMENT ON HIGH DETAIL MAP UNITS

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry means soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
AbB, AcA Alamogordo	Slight	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.
AdB*:					
Alamogordo	Slight	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.
Aztec	Severe: small stones.	Slight	Slight	Slight	Slight.
AhB*:					
Alamogordo	Slight	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.
McCullough	Slight	Slight	Slight	Slight	Moderate: low strength.
AkA Alamogordo Variant	Slight	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.
AnD Aztec	Severe: small stones.	Slight	Slight	Moderate: slope.	Slight.
AoB*:					
Aztec	Severe: small stones.	Slight	Slight	Slight	Slight.
Alamogordo	Slight	Moderate: low strength.	Moderate: low strength	Moderate: low strength.	Moderate: low strength.
Gu*. Gullied land					
GyC*, GyE*. Gypsum land					
HbA Holloman	Moderate: depth to rock.	Moderate: depth to rock, low strength.	Severe: depth to rock.	Moderate: depth to rock, low strength.	Moderate: depth to rock, low strength.
HcA*:					
Holloman	Moderate: depth to rock.	Moderate: depth to rock, low strength.	Severe: depth to rock.	Moderate: depth to rock, low strength.	Moderate: depth to rock, low strength.
Gypsum land.					
LbB Largo	Moderate: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods, shrink-swell, low strength.
LcA, LdA, LdB, LdB2 Largo	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, low strength.
LeA Largo	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT ON HIGH DETAIL MAP UNITS--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
LfB*:					
Largo	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, low strength.
Ogral	Severe: small stones.	Slight	Slight	Slight	Slight.
McB: McCullough	Slight	Slight	Slight	Slight	Moderate: low strength.
MdA: McCullough Variant	Slight	Slight	Moderate: shrink-swell.	Slight	Moderate: low strength, shrink-swell.
NaC*:					
Nickel	Severe: small stones.	Slight	Slight	Moderate: slope.	Slight.
Aztec	Severe: small stones.	Slight	Slight	Moderate: slope.	Slight.
PkA, PlA, PmA, PmB, PmB2, PnA: Prelo	Slight	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: low strength.
PpA: Prelo	Moderate: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: low strength.
PvB*:					
Prelo	Slight	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: low strength.
Prelo Variant	Slight	Moderate: shrink-swell, low strength.	Moderate: shrink-swell.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.
RbA, RcB2: Reeves	Slight	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.
RdA: Reeves	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
TbA: Tobler	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods.
TcA: Tome	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, low strength.
TcB, TeB: Tome	Moderate: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: shrink-swell, floods, low strength.
TfB*:					
Tome	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, low strength.
Emot	Severe: small stones.	Slight	Slight	Slight	Slight.
TvA*. Torrifluvents					

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT ON HIGH DETAIL MAP UNITS--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
UaA*. Ustic Torriorthents					

* See map unit description for the composition and behavior of the map unit.

TABLE 9.--SANITARY FACILITIES ON LOW DETAIL MAP UNITS

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms used to rate soils. Absence of an entry means soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AEC*:					
Alamogordo	Slight	Severe: seepage.	Slight	Slight	Poor: area reclaim.
Gypsum land.					
AGE*:					
Alamogordo	Severe: slope.	Severe: slope, seepage.	Severe: slope.	Severe: slope.	Poor: area reclaim, slope.
Gypsum land.					
Aztec	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: slope.	Poor: area reclaim, slope, small stones.
AMC Armesa	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Fair: area reclaim.
AZF*:					
Aztec	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: slope.	Poor: area reclaim, slope, small stones.
Rock outcrop.					
Lozier	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope.	Poor: thin layer, small stones, slope.
BAF*. Badland					
BOA*:					
Bluepoint	Slight	Severe: seepage.	Moderate: too sandy.	Slight	Fair: too sandy.
Onite	Slight	Severe: seepage.	Slight	Slight	Good.
Wink	Slight	Severe: seepage.	Slight	Slight	Good.
BRF Borrego	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Poor: thin layer, slope, area reclaim.
CFA Crowflats	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Good.
DEB Deama	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer, large stones, small stones.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES ON LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
DEF----------------- Deama	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Poor: slope, large stones, small stones.
DRF*, DRG*:					
Deama---------------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, large stones, small stones.
Rock outcrop.					
DSF*:					
Deama---------------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, large stones, small stones.
Rock outcrop.					
Holloman Variant---	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, thin layer.
DTB*:					
Dona Ana-----------	Moderate: percs slowly.	Moderate: seepage, slope.	Slight-----------	Slight-----------	Good.
Berino-------------	Moderate: percs slowly.	Moderate: seepage, slope.	Slight-----------	Slight-----------	Good.
DYE*:					
Dye----------------	Severe: percs slowly, slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: slope.	Poor: thin layer, too clayey, slope.
Encierro-----------	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock.	Moderate: slope.	Poor: area reclaim, thin layer.
ECF*:					
Ector--------------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope.	Poor: thin layer, small stones.
Rock outcrop.					
ESB*:					
Espy---------------	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Slight-----------	Poor: thin layer, area reclaim.
Shanta Variant-----	Severe: percs slowly.	Slight-----------	Moderate: too clayey.	Slight-----------	Fair: too clayey.
GZB*:					
Gypsum land.					
Holloman-----------	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight-----------	Poor: area reclaim, thin layer.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES ON LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
HOB*:					
Holloman	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: area reclaim, thin layer.
Gypsum land.					
Yesum	Moderate: percs slowly.	Moderate: slope, seepage.	Slight	Slight	Poor: area reclaim.
HPB*:					
Holloman	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: area reclaim, thin layer.
Reeves	Moderate: percs slowly.	Moderate: seepage.	Slight	Slight	Fair: area reclaim.
JAB*:					
Jal	Slight	Moderate: seepage.	Slight	Slight	Good.
Tome	Severe: percs slowly.	Slight	Moderate: floods.	Moderate: floods.	Good.
JEC*:					
Jerag	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Slight	Poor: thin layer, area reclaim.
Philder	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Slight	Poor: thin layer, area reclaim.
Armesa	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Fair: area reclaim.
LAB* La Fonda	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
LDB Largo	Severe: percs slowly.	Severe: floods.	Moderate: floods.	Moderate: floods.	Good.
LGB*:					
Largo	Severe: percs slowly.	Severe: floods.	Moderate: floods.	Moderate: floods.	Good.
Ogral	Slight	Severe: seepage, small stones.	Slight	Slight	Poor: small stones, area reclaim.
LOB*:					
Lozier	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer, small stones.
Rock outcrop.					
LOD*:					
Lozier	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Moderate: slope.	Poor: thin layer, small stones.
Rock outcrop.					

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES ON LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
MEA: Mead	Severe: percs slowly, floods.	Slight	Severe: too clayey, floods.	Severe: floods.	Poor: too clayey.
MJA*:					
Mimbres	Severe: percs slowly.	Severe: floods.	Moderate: too clayey, floods.	Moderate: floods.	Fair: too clayey.
Jal	Slight	Moderate: seepage.	Slight	Slight	Good.
MPA*:					
Mimbres	Severe: percs slowly.	Severe: floods.	Moderate: too clayey, floods.	Moderate: floods.	Fair: too clayey.
Prelo	Severe: percs slowly.	Slight	Moderate: too clayey.	Slight	Fair: area reclaim, too clayey.
MTA*:					
Mimbres	Severe: percs slowly.	Severe: floods.	Moderate: too clayey, floods.	Moderate: floods.	Fair: too clayey.
Tome	Severe: percs slowly.	Slight	Moderate: floods.	Moderate: floods.	Good.
MXC: Montecito	Severe: percs slowly.	Moderate: slope, seepage.	Moderate: small stones, too clayey.	Slight	Fair: too clayey.
NTD*:					
Nickel	Moderate: slope.	Severe: slope, small stones.	Severe: small stones.	Moderate: slope.	Poor: small stones.
Tencee	Severe: cemented pan.	Severe: cemented pan, slope.	Severe: cemented pan.	Moderate: slope.	Poor: area reclaim, small stones, thin layer.
OPB*:					
Onite	Slight	Severe: seepage.	Slight	Slight	Good.
Pintura	Slight	Severe: seepage.	Slight	Slight	Poor: too sandy, area reclaim.
PAE*:					
Pena	Moderate: slope.	Severe: slope.	Moderate: small stones.	Moderate: slope.	Poor: small stones.
Aztec Variant	Moderate: slope	Severe: slope, seepage, small stones.	Severe: seepage.	Severe: seepage.	Poor: small stones, area reclaim, seepage.
PCB*:					
Pena	Slight	Moderate: seepage, slope, small stones.	Moderate: small stones.	Slight	Poor: small stones.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES ON LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
PCB*:					
Cale	Moderate: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
Kerrick	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Slight	Fair: thin layer, too clayey.
PDF*:					
Pena Variant	Severe: slope.	Severe: slope, seepage.	Severe: slope.	Severe: slope.	Poor: area reclaim, slope, small stones.
Rock outcrop.					
PEC Philder	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Slight	Poor: thin layer, area reclaim.
PFB*:					
Philder	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Slight	Poor: thin layer, area reclaim.
Armesa	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Fair: area reclaim.
PGB*:					
Pintura	Slight	Severe: seepage.	Severe: too sandy.	Slight	Poor: too sandy, area reclaim.
Dona Ana	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
PHB*:					
Pintura	Slight	Severe: seepage.	Severe: too sandy.	Slight	Poor: too sandy, area reclaim.
Tome	Severe: percs slowly.	Moderate: slope.	Moderate: floods.	Moderate: floods.	Good.
Dona Ana	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
POB Prelo	Severe: percs slowly.	Slight	Moderate: too clayey.	Slight	Fair: area reclaim, too clayey.
RAB*:					
Reakor	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Fair: too clayey.
Tome	Severe: percs slowly.	Moderate: slope.	Moderate: floods.	Moderate: floods.	Good.
Tencee	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Slight	Poor: area reclaim, small stones, thin layer.
REB*:					
Reeves Variant	Slight	Moderate: seepage.	Slight	Slight	Fair: area reclaim.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES ON LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
REB*:					
Shanta	Moderate: percs slowly.	Moderate: seepage.	Severe: seepage.	Slight	Good.
RFA*:					
Reyab	Severe: percs slowly.	Severe: floods.	Moderate: floods.	Moderate: floods.	Good.
Armesa	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Fair: area reclaim.
ROG*. Rock outcrop					
RPG*:					
Rock outcrop.					
Deama	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, large stones, small stones.
RRF*:					
Rock outcrop.					
Lozier	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Poor: thin layer, small stones.
RTE*:					
Rock outcrop.					
Tortugas	Severe: depth to rock, slope.	Severe: depth to rock, small stones, slope.	Severe: depth to rock.	Severe: slope.	Poor: thin layer, small stones, slope.
Ustifluvents.					
RUA*:					
Ruidoso	Severe: percs slowly.	Slight	Moderate: too clayey.	Slight	Fair: too clayey.
SGA*:					
Shanta	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Fair: too clayey.
Gabaldon	Moderate: percs slowly, floods.	Severe: floods.	Moderate: floods.	Moderate: floods.	Good.
TAC Tencee	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Slight	Poor: area reclaim, small stones, thin layer.
TDB Tome	Severe: percs slowly.	Moderate: slope.	Moderate: floods.	Moderate: floods.	Good.
TOE Tortugas	Severe: depth to rock, slope.	Severe: depth to rock, small stones, slope.	Severe: depth to rock.	Severe: slope.	Poor: thin layer, small stones, slope.
TPE*:					
Tortugas	Severe: depth to rock, slope.	Severe: depth to rock, small stones, slope.	Severe: depth to rock.	Severe: slope.	Poor: thin layer, small stones, slope.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES ON LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
TPE*:					
Deama	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Poor: slope, large stones, small stones.
TPG*:					
Tortugas	Severe: depth to rock, slope.	Severe: depth to rock, small stones, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: thin layer, small stones, slope.
Deama	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, large stones, small stones.

* See map unit description for the composition and behavior of the map unit.

TABLE 10.--SANITARY FACILITIES ON HIGH DETAIL MAP UNITS

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms used to rate soils. Absence of an entry means soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AbB, AcA: Alamogordo	Slight	Severe: seepage.	Slight	Slight	Poor: area reclaim.
AdB*:					
Alamogordo	Slight	Severe: seepage.	Slight	Slight	Poor: area reclaim.
Aztec	Slight	Severe: seepage.	Slight	Slight	Poor: area reclaim, small stones.
AhB*:					
Alamogordo	Slight	Severe: seepage.	Slight	Slight	Poor: area reclaim.
McCullough	Slight	Severe: seepage.	Slight	Slight	Good.
AkA: Alamogordo Variant	Slight	Moderate: seepage.	Slight	Slight	Poor: area reclaim.
AnD: Aztec	Slight	Severe: seepage, slope.	Slight	Slight	Poor: area reclaim, seepage, small stones.
AoB*:					
Aztec	Slight	Severe: seepage.	Slight	Slight	Poor: area reclaim, seepage, small stones.
Alamogordo	Slight	Severe: seepage.	Slight	Slight	Poor: area reclaim.
Gu*. Gullied land					
GyC*, GyE*. Gypsum land					
HbA: Holloman	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: area reclaim, thin layer.
HcA*:					
Holloman	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: area reclaim, thin layer.
Gypsum land.					
LbB: Largo	Severe: percs slowly.	Severe: floods.	Moderate: floods.	Moderate: floods.	Good.
LcA: Largo	Severe: percs slowly.	Slight	Moderate: too clayey.	Slight	Fair: too clayey.
LdA: Largo	Severe: percs slowly.	Moderate: seepage.	Slight	Slight	Good.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES ON HIGH DETAIL MAP UNITS--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
LdB, LdB2: Largo	Severe: percs slowly.	Moderate: slope, seepage.	Slight	Slight	Good.
LeA: Largo	Severe: floods, percs slowly.	Severe: floods.	Severe: floods.	Severe: floods.	Good.
LfB*:					
Largo	Severe: percs slowly.	Moderate: slope, seepage.	Slight	Slight	Good.
Ogral	Slight	Severe: seepage, small stones.	Slight	Slight	Poor: small stones, area reclaim.
McB: McCullough	Slight	Severe: seepage.	Slight	Slight	Good.
MdA: McCullough Variant	Severe: percs slowly.	Slight	Slight	Slight	Good.
NaC*:					
Nickel	Slight	Severe: small stones.	Severe: small stones.	Slight	Poor: small stones.
Aztec	Slight	Severe: seepage.	Slight	Slight	Poor: area reclaim, seepage, small stones.
PkA, PlA, PmA: Prelo	Severe: percs slowly.	Slight	Moderate: too clayey.	Slight	Fair: area reclaim, too clayey.
PmB, PmB2: Prelo	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: area reclaim, too clayey.
PnA: Prelo	Severe: percs slowly.	Slight	Moderate: too clayey.	Slight	Fair: area reclaim, too clayey.
PpA: Prelo	Severe: percs slowly.	Severe: floods.	Moderate: floods, too clayey.	Moderate: floods.	Fair: area reclaim, too clayey.
PvB*:					
Prelo	Severe: percs slowly.	Slight	Moderate: too clayey.	Slight	Fair: area reclaim, too clayey.
Prelo Variant	Severe: percs slowly.	Severe: seepage, small stones.	Slight	Slight	Fair: area reclaim, too clayey, small stones.
RbA, RcB2: Reeves	Moderate: percs slowly.	Moderate: seepage.	Slight	Slight	Fair: area reclaim.
RdA: Reeves	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Fair: area reclaim.
TbA: Tobler	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Good.
TcA: Tome	Severe: percs slowly.	Slight	Slight	Slight	Good.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES ON HIGH DETAIL MAP UNITS--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
TcB, TeB: Tome	Severe: percs slowly.	Moderate: slope.	Moderate: floods.	Moderate: floods.	Good.
TfB*:					
Tome	Severe: percs slowly.	Slight	Slight	Slight	Good.
Emot	Slight	Severe: seepage, small stones.	Slight	Slight	Poor: area reclaim, small stones.
TvA*. Torrifluvents					
UaA*. Ustic Torriorthents					

* See map unit description for the composition and behavior of the map unit.

TABLE 11.--CONSTRUCTION MATERIALS ON LOW DETAIL MAP UNITS

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor," and "unsuited." Absence of an entry means soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
AEC*:				
Alamogordo	Fair: area reclaim, low strength.	Unsuited	Unsuited	Poor: thin layer, area reclaim, excess salt.
Gypsum land.				
AGE*:				
Alamogordo	Poor: slope.	Unsuited	Unsuited	Poor: area reclaim, excess salt, slope.
Gypsum land.				
Aztec	Fair: slope.	Poor: excess fines.	Fair: excess fines.	Poor: small stones, slope, area reclaim.
AMC Armesa	Fair: low strength, area reclaim, shrink-swell.	Unsuited	Unsuited	Poor: excess lime, area reclaim.
AZF*:				
Aztec	Poor: slope.	Poor: excess fines.	Fair: excess fines.	Poor: small stones, slope, area reclaim.
Rock outcrop.				
Lozier	Poor: thin layer.	Unsuited: thin layer, excess fines.	Unsuited: thin layer, small stones.	Poor: thin layer, small stones.
BAF*. Badland				
BOA*:				
Bluepoint	Good	Poor: excess fines.	Unsuited	Poor: too sandy, excess sodium.
Onite	Good	Poor: excess fines.	Poor: excess fines.	Fair: too sandy.
Wink	Good	Poor: excess fines.	Unsuited	Good.
BRF Borrego	Poor: shrink-swell, slope, thin layer.	Unsuited	Unsuited	Poor: area reclaim, slope, thin layer.
CFA Crowflats	Fair: low strength.	Unsuited	Unsuited	Good.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS ON LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
DEB: Deama	Poor: area reclaim, thin layer.	Unsuited	Unsuited	Poor: large stones, small stones, excess lime.
DEF: Deama	Poor: area reclaim, thin layer.	Unsuited	Unsuited	Poor: slope, large stones, small stones.
DRF*, DRG*:				
Deama	Poor: slope, area reclaim, thin layer.	Unsuited	Unsuited	Poor: slope, large stones, small stones.
Rock outcrop.				
DSF*:				
Deama	Poor: slope, area reclaim, thin layer.	Unsuited	Unsuited	Poor: slope, large stones, small stones.
Rock outcrop.				
Holloman Variant	Poor: slope, thin layer, area reclaim.	Unsuited	Unsuited	Poor: slope.
DTB*:				
Dona Ana	Fair: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
Berino	Fair: low strength, shrink-swell.	Unsuited	Unsuited	Fair: thin layer.
DYE*:				
Dye	Poor: thin layer, shrink-swell, low strength.	Unsuited	Unsuited	Poor: slope.
Encierro	Poor: low strength, shrink-swell, thin layer.	Unsuited	Unsuited	Poor: area reclaim, small stones, thin layer.
ECF*:				
Ector	Poor: thin layer, slope.	Unsuited: thin layer, excess fines.	Unsuited: thin layer, excess fines.	Poor: thin layer, small stones.
Rock outcrop.				
ESB*:				
Espy	Poor: thin layer, area reclaim, shrink-swell, piping.	Poor: excess fines.	Poor: excess fines.	Poor: thin layer, area reclaim.
Shanta Variant	Fair: low strength, shrink-swell.	Unsuited	Unsuited	Fair: thin layer.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS ON LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
GZB*: Gypsum land.				
Holloman	Poor: area reclaim, thin layer.	Unsuited	Unsuited	Poor: area reclaim, excess salt.
HOB*: Holloman	Poor: area reclaim, thin layer.	Unsuited	Unsuited	Poor: area reclaim, excess salt.
Gypsum land.				
Yesum	Poor: area reclaim.	Unsuited	Unsuited	Poor: area reclaim, excess salt.
HPB*: Holloman	Poor: area reclaim, thin layer.	Unsuited	Unsuited	Poor: area reclaim, excess salt.
Reeves	Fair: shrink-swell, low strength, area reclaim.	Unsuited	Unsuited	Fair: area reclaim, excess salt.
JAB*: Jal	Fair: low strength.	Unsuited	Unsuited	Poor: excess lime.
Tome	Fair: shrink-swell, low strength.	Unsuited	Unsuited	Fair: area reclaim.
JEC*: Jerag	Poor: thin layer, area reclaim.	Unsuited	Unsuited: thin layer.	Poor: thin layer, area reclaim.
Philder	Poor: thin layer, area reclaim.	Unsuited	Unsuited: thin layer	Poor: small stones, area reclaim.
Armesa	Fair: low strength, area reclaim, shrink-swell.	Unsuited	Unsuited	Poor: excess lime, area reclaim.
LAB* La Fonda	Fair: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
LDB Largo	Fair: shrink-swell, low strength.	Unsuited	Unsuited	Good.
LGB*: Largo	Fair: shrink-swell, low strength.	Unsuited	Unsuited	Good.
Ogral	Good	Poor: excess fines, small stones.	Poor: excess fines.	Fair: area reclaim, small stones.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS ON LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
LOB*, LOD*:				
Lozier	Poor: thin layer.	Unsuited: thin layer, excess fines.	Unsuited: thin layer, small stones.	Poor: thin layer, small stones.
Rock outcrop.				
MEA Mead	Poor: low strength.	Unsuited	Unsuited	Poor: excess salt, too clayey.
MJA*:				
Mimbres	Poor: low strength.	Unsuited	Unsuited	Fair: too clayey.
Jal	Fair: low strength.	Unsuited	Unsuited	Poor: excess lime.
MPA*:				
Mimbres	Poor: low strength.	Unsuited	Unsuited	Fair: too clayey.
Prelo	Poor: low strength.	Unsuited	Unsuited	Fair: too clayey.
MTA*:				
Mimbres	Poor: low strength.	Unsuited	Unsuited	Fair: too clayey.
Tome	Fair: shrink-swell, low strength.	Unsuited	Unsuited	Fair: area reclaim.
MXC Montecito	Poor: low strength, shrink-swell.	Unsuited	Unsuited	Poor: too clayey.
NTD*:				
Nickel	Good	Unsuited	Fair: excess fines.	Poor: small stones.
Tencee	Poor: area reclaim, thin layer.	Unsuited	Unsuited: thin layer.	Poor: area reclaim, small stones, thin layer.
OPB*:				
Onite	Good	Poor: excess fines.	Poor: excess fines.	Fair: too sandy.
Pintura	Good	Fair: excess fines.	Unsuited	Poor: area reclaim, too sandy.
PAE*:				
Pena	Fair: frost action.	Poor: excess fines, small stones.	Poor: excess fines, small stones.	Poor: small stones.
Aztec Variant	Good	Unsuited	Fair: excess fines.	Poor: area reclaim, excess lime, small stones.
PCB*:				
Pena	Fair: frost action.	Poor: excess fines, small stones.	Poor: excess fines, small stones.	Poor: small stones.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS ON LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
PCB*:				
Cale	Fair: low strength, shrink-swell, frost action.	Unsuited	Unsuited	Fair: thin layer, too clayey.
Kerrick	Fair: thin layer, low strength.	Unsuited	Unsuited	Fair: thin layer, too clayey.
PDF*:				
Pena Variant	Poor: slope.	Fair: excess fines.	Fair: excess fines.	Poor: area reclaim, slope.
Rock outcrop.				
PEC Philder	Poor: thin layer, area reclaim.	Unsuited	Unsuited: thin layer.	Poor: small stones, area reclaim.
PFB*:				
Philder	Poor: thin layer, area reclaim.	Unsuited	Unsuited: thin layer.	Poor: small stones, area reclaim.
Armesa	Fair: low strength, area reclaim, shrink-swell.	Unsuited	Unsuited	Poor: excess lime, area reclaim.
PGB*:				
Pintura	Good	Fair: excess fines.	Unsuited	Poor: area reclaim, too sandy.
Dona Ana	Fair: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
PHB*:				
Pintura	Good	Fair: excess fines.	Unsuited	Poor: area reclaim, too sandy.
Tome	Fair: shrink-swell, low strength.	Unsuited	Unsuited	Fair: area reclaim.
Dona Ana	Fair: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
POB Prelo	Poor: low strength.	Unsuited	Unsuited	Fair: too clayey.
RAB*:				
Reakor	Fair: low strength, shrink-swell.	Unsuited	Unsuited	Fair: too clayey.
Tome	Fair: shrink-swell, low strength.	Unsuited	Unsuited	Fair: area reclaim.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS ON LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
RAB*:				
Tencee	Poor: area reclaim, thin layer.	Unsuited	Unsuited: thin layer.	Poor: area reclaim, small stones, thin layer.
REB*:				
Reeves Variant	Fair: low strength, shrink-swell.	Unsuited	Unsuited	Fair: area reclaim.
Shanta	Fair: frost action.	Good	Good	Good.
RFA*:				
Reyab	Fair: low strength, shrink-swell.	Unsuited	Unsuited	Good.
Armesa	Fair: low strength, area reclaim, shrink-swell.	Unsuited	Unsuited	Poor: excess lime, area reclaim.
ROG*. Rock outcrop				
RPG*:				
Rock outcrop.				
Deama	Poor: slope, area reclaim, thin layer.	Unsuited	Unsuited	Poor: slope, large stones, small stones.
RRF*:				
Rock outcrop.				
Lozier	Poor: thin layer.	Unsuited: thin layer, excess fines.	Unsuited: thin layer, small stones.	Poor: thin layer, small stones.
RTE*:				
Rock outcrop.				
Tortugas	Poor: thin layer, area reclaim.	Unsuited	Unsuited: thin layer.	Poor: small stones, slope, thin layer.
Ustifluvents.				
RUA*:				
Ruidoso	Poor: low strength, shrink-swell.	Unsuited	Unsuited	Fair: thin layer.
SGA*:				
Shanta	Poor: low strength.	Unsuited	Unsuited	Fair: too clayey.
Gabaldon	Fair: low strength, frost action, shrink-swell.	Unsuited	Unsuited	Good.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS ON LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
TAC: Tencee	Poor: area reclaim, thin layer.	Unsuited	Unsuited: thin layer.	Poor: area reclaim, small stones, thin layer.
TDB: Tome	Fair: shrink-swell, low strength.	Unsuited	Unsuited	Fair: area reclaim.
TOE: Tortugas	Poor: thin layer, area reclaim.	Unsuited	Unsuited: thin layer.	Poor: small stones, slope, thin layer.
TPE*:				
Tortugas	Poor: thin layer, area reclaim.	Unsuited	Unsuited: thin layer.	Poor: small stones, slope, thin layer.
Deama	Poor: area reclaim, thin layer.	Unsuited	Unsuited	Poor: slope, large stones, small stones.
TPG*:				
Tortugas	Poor: thin layer, slope, area reclaim.	Unsuited	Unsuited: thin layer.	Poor: small stones, slope, thin layer.
Deama	Poor: slope, area reclaim, thin layer.	Unsuited	Unsuited	Poor: slope, large stones, small stones.

* See map unit description for the composition and behavior of the map unit.

TABLE 12.--CONSTRUCTION MATERIALS ON HIGH DETAIL MAP UNITS

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor," and "unsuited." Absence of an entry means soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
AbB, AcA: Alamogordo	Fair: area reclaim, low strength.	Unsuited	Unsuited	Poor: thin layer, area reclaim, excess salt.
AdB*:				
Alamogordo	Fair: area reclaim, low strength.	Unsuited	Unsuited	Poor: thin layer, area reclaim, excess salt.
Aztec	Good	Poor: excess fines.	Fair: excess fines.	Poor: small stones, excess lime, area reclaim.
AhB*:				
Alamogordo	Fair: area reclaim, low strength.	Unsuited	Unsuited	Poor: thin layer, area reclaim, excess salt.
McCullough	Fair: low strength.	Unsuited	Unsuited	Good.
AkA: Alamogordo Variant	Fair: low strength, area reclaim.	Unsuited	Unsuited	Poor: area reclaim, excess salt.
AnD: Aztec	Good	Poor: excess fines.	Fair: excess fines.	Poor: small stones, excess lime, area reclaim.
AoB*:				
Aztec	Good	Poor: excess fines.	Fair: excess fines.	Poor: small stones, excess lime, area reclaim.
Alamogordo	Fair: area reclaim, low strength.	Unsuited	Unsuited	Poor: thin layer, area reclaim, excess salt.
Gu*. Gullied land				
GyC*, GyE*. Gypsum land				
HbA: Holloman	Poor: area reclaim, thin layer.	Unsuited	Unsuited	Poor: area reclaim, excess salt.
HcA*:				
Holloman	Poor: area reclaim, thin layer.	Unsuited	Unsuited	Poor: area reclaim, excess salt.
Gypsum land.				

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS ON HIGH DETAIL MAP UNITS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
LbB, LcA-------------- Largo	Fair: shrink-swell, low strength.	Unsuited-------------	Unsuited-------------	Good.
LdA, LdB, LdB2, LeA--- Largo	Fair: shrink-swell, low strength.	Unsuited-------------	Unsuited-------------	Good.
LfB*:				
Largo----------------	Fair: shrink-swell, low strength.	Unsuited-------------	Unsuited-------------	Good.
Ogral----------------	Good-----------------	Poor: excess fines, small stones.	Poor: excess fines.	Fair: area reclaim, small stones.
McB------------------ McCullough	Fair: low strength.	Unsuited-------------	Unsuited-------------	Good.
MdA------------------ McCullough Variant	Fair: low strength, shrink-swell.	Unsuited-------------	Unsuited-------------	Good.
NaC*:				
Nickel---------------	Good-----------------	Unsuited-------------	Fair: excess fines.	Poor: small stones.
Aztec----------------	Good-----------------	Poor: excess fines.	Fair: excess fines.	Poor: small stones, excess lime, area reclaim.
PkA, PlA, PmA, PmB, PmB2, PnA, PpA------- Prelo	Poor: low strength.	Unsuited-------------	Unsuited-------------	Fair: too clayey.
PvB*:				
Prelo----------------	Poor: low strength.	Unsuited-------------	Unsuited-------------	Fair: too clayey.
Prelo Variant--------	Fair: shrink-swell, low strength, area reclaim.	Unsuited-------------	Fair: excess fines.	Fair: too clayey.
RbA, RcB2------------ Reeves	Fair: shrink-swell, low strength, area reclaim.	Unsuited-------------	Unsuited-------------	Fair: area reclaim, excess salt.
RdA------------------ Reeves	Fair: low strength, shrink-swell.	Unsuited-------------	Unsuited-------------	Fair: area reclaim, excess salt.
TbA------------------ Tobler	Fair: low strength.	Poor: excess fines.	Unsuited-------------	Good.
TcA, TcB, TeB--------- Tome	Fair: shrink-swell, low strength.	Unsuited-------------	Unsuited-------------	Fair: area reclaim.
TfB*:				
Tome-----------------	Fair: shrink-swell, low strength.	Unsuited-------------	Unsuited-------------	Fair: area reclaim.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS ON HIGH DETAIL MAP UNITS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
TfB*:				
Emot	Good	Unsuited	Poor: excess fines.	Poor: area reclaim, small stones.
TvA*. Torrifluvents				
UaA*. Ustic Torriorthents				

* See map unit description for the composition and behavior of the map unit.

TABLE 13.--WATER MANAGEMENT ON LOW DETAIL MAP UNITS

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. Absence of an entry means soil was not evaluated]

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions
AEC*:					
Alamogordo	Seepage, slope.	Low strength, piping, excess salt.	Excess salt	Droughty, excess salt.	Piping, rooting depth, slope.
Gypsum land.					
AGE*:					
Alamogordo	Seepage, slope.	Low strength, piping, excess salt.	Excess salt, slope.	Droughty, erodes easily, slope.	Erodes easily, piping, slope.
Gypsum land.					
Aztec	Seepage, slope.	Hard to pack, seepage, unstable fill.	Slope	Droughty, slope.	Slope, small stones.
AMC Armesa	Seepage	Piping, low strength.	Favorable	Erodes easily, soil blowing, excess lime.	Erodes easily, soil blowing.
AZF*:					
Aztec	Seepage, slope.	Hard to pack, seepage, unstable fill.	Slope	Droughty, slope.	Slope, small stones.
Rock outcrop.					
Lozier	Depth to rock	Thin layer	Not needed	Rooting depth	Depth to rock.
BAF*. Badland					
BOA*:					
Bluepoint	Seepage	Piping	Cutbanks cave	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.
Onite	Seepage	Piping, seepage.	Slope	Droughty, slope, soil blowing.	Soil blowing, piping.
Wink	Seepage	Piping, erodes easily.	Not needed	Fast intake, droughty, erodes easily.	Erodes easily, too sandy.
BRF Borrego	Depth to rock, slope.	Thin layer, low strength, compressible.			Depth to rock, slope.
CFA Crowflats	Seepage	Low strength, piping.	Floods	Floods	Erodes easily, piping.
DEB Deama	Depth to rock	Thin layer, piping.	Depth to rock, slope.	Droughty, rooting depth, slope.	Depth to rock, rooting depth, slope.
DEF Deama	Slope, depth to rock.	Thin layer, piping.	Depth to rock, slope.	Droughty, rooting depth, slope.	Depth to rock, rooting depth, slope.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT ON LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions
DRF*, DRG*:					
Deama	Slope, depth to rock.	Thin layer, piping.	Depth to rock, slope.	Droughty, rooting depth, slope.	Depth to rock, rooting depth, slope.
Rock outcrop.					
DSF*:					
Deama	Slope, depth to rock.	Thin layer, piping.	Depth to rock, slope.	Droughty, rooting depth, slope.	Depth to rock, rooting depth, slope.
Rock outcrop.					
Holloman Variant	Slope, seepage, depth to rock.	Low strength, piping, thin layer.	Depth to rock, slope.	Rooting depth, slope, erodes easily.	Depth to rock, erodes easily, slope.
DTB*:					
Dona Ana	Seepage, slope.	Low strength, compressible, piping.	Slope	Erodes easily, slope, soil blowing.	Erodes easily, piping, slope.
Berino	Seepage, slope.	Low strength, compressible, piping.	Favorable	Slope, soil blowing, erodes easily.	Erodes easily, piping, slope.
DYE*:					
Dye	Depth to rock, slope.	Thin layer, low strength.	Depth to rock, percs slowly.	Rooting depth, percs slowly.	Depth to rock, slope, percs slowly.
Encierro	Depth to rock, slope.	Thin layer, low strength.	Depth to rock, percs slowly.	Droughty, percs slowly, rooting depth.	Depth to rock, percs slowly, slope.
ECF*:					
Ector	Depth to rock	Thin layer	Not needed	Rooting depth	Depth to rock.
Rock outcrop.					
ESB*:					
Espy	Cemented pan, seepage.	Thin layer	Not needed	Droughty, rooting depth.	Cemented pan, rooting depth.
Snanta Variant	Favorable	Low strength, piping.	Percs slowly	Slope, erodes easily, percs slowly.	Percs slowly, erodes easily.
GZB*:					
Gypsum land.					
Holloman	Depth to rock, seepage, slope.	Low strength, piping, excess salt.	Depth to rock, excess salt, complex slope.	Droughty, excess salt, rooting depth.	Depth to rock, rooting depth, complex slope.
HOB*:					
Holloman	Depth to rock, seepage, slope.	Low strength, piping, excess salt.	Depth to rock, excess salt, complex slope.	Droughty, excess salt, rooting depth.	Depth to rock, rooting depth, complex slope.
Gypsum land.					
Yesum	Slope, seepage.	Low strength, excess salt, piping.	Slope, excess salt.	Slope, erodes easily, excess salt.	Erodes easily.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT ON LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions
HPB*:					
Holloman	Depth to rock, seepage.	Low strength, piping, excess salt.	Depth to rock, excess salt, complex slope.	Droughty, excess salt, rooting depth.	Depth to rock, rooting depth, complex slope.
Reeves	Seepage, slope.	Thin layer, hard to pack, piping.	Excess salt	Droughty, excess salt.	Slope, erodes easily.
JAB*:					
Jal	Seepage	Low strength, piping.	Poor outlets	Droughty, excess lime, erodes easily.	Piping, erodes easily.
Tome	Favorable	Low strength, piping.	Percs slowly	Erodes easily, percs slowly.	Erodes easily, percs slowly, piping.
JEC*:					
Jerag	Cemented pan	Thin layer, low strength.	Cemented pan	Rooting depth, erodes easily, droughty.	Cemented pan, rooting depth.
Philder	Cemented pan, seepage, slope.	Thin layer	Cemented pan, slope.	Droughty, rooting depth, slope.	Cemented pan, rooting depth, complex slope.
Armesa	Seepage	Piping, low strength.	Favorable	Erodes easily, soil blowing, excess lime.	Erodes easily, soil blowing.
LAB* La Fonda	Seepage, slope.	Low strength, compressible, piping.	Favorable	Slope, erodes easily.	Erodes easily, piping, slope.
LDB Largo	Seepage	Piping, low strength.	Floods	Erodes easily, floods.	Piping, percs slowly, erodes easily.
LGB*:					
Largo	Slope, seepage.	Piping, low strength.	Floods	Erodes easily, floods.	Piping, percs slowly, erodes easily.
Ogral	Seepage	Hard to pack, piping, seepage.	Slope	Droughty, erodes easily, slope.	Small stones.
LOB*, LOD*:					
Lozier	Depth to rock	Thin layer	Not needed	Rooting depth	Depth to rock.
Rock outcrop.					
MEA Mead	Favorable	Compressible, excess salt, low strength.	Percs slowly, excess salt.	Percs slowly, excess salt.	Too clayey, poor outlets, percs slowly.
MJA*:					
Mimbres	Seepage	Low strength	Percs slowly, poor outlets.	Erodes easily	Erodes easily, piping.
Jal	Seepage	Low strength, piping.	Poor outlets	Droughty, excess lime, erodes easily.	Piping, erodes easily.
MPA*:					
Mimbres	Seepage	Low strength	Percs slowly, poor outlets.	Erodes easily	Erodes easily, piping.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT ON LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions
MPA*:					
Prelo	Favorable	Low strength	Percs slowly, excess salt.	Erodes easily	Erodes easily.
MTA*:					
Mimbres	Seepage	Low strength	Percs slowly, poor outlets.	Erodes easily	Erodes easily, piping.
Tome	Favorable	Low strength, piping.	Percs slowly	Erodes easily, percs slowly.	Erodes easily, percs slowly, piping.
MXC Montecito	Slope, seepage.	Low strength	Percs slowly, slope.	Slope, slow intake, soil blowing.	Erodes easily, percs slowly, slope.
NTD*:					
Nickel	Seepage, slope.	Seepage	Slope, percs slowly.	Slope, percs slowly.	Small stones, slope.
Tencee	Cemented pan, slope.	Piping, thin layer.	Cemented pan, complex slope.	Droughty, rooting depth, slope.	Cemented pan, complex slope, rooting depth.
OPB*:					
Onite	Seepage	Piping, seepage.	Slope	Droughty, slope, soil blowing.	Soil blowing, piping.
Pintura	Seepage	Erodes easily, piping, seepage.	Slope, cutbanks cave.	Slope, soil blowing, fast intake.	Soil blowing, too sandy.
PAE*:					
Pena	Seepage, slope, small stones.	Favorable	Slope	Droughty, excess lime, slope.	Slope.
Aztec Variant	Seepage, slope.	Piping, seepage, low strength.	Slope	Droughty, slope.	Slope, small stones, seepage.
PCB*:					
Pena	Seepage, slope, small stones.	Favorable	Slope	Droughty, excess lime, slope.	Slope.
Cale	Seepage	Low strength, piping.	Percs slowly, slope.	Erodes easily, slope, soil blowing.	Not needed.
Kerrick	Cemented pan	Thin layer, low strength.	Not needed	Rooting depth	Cemented pan, rooting depth.
PDF*:					
Pena Variant	Slope, seepage.	Seepage, low strength.	Not needed	Slope, seepage, droughty.	Slope, small stones.
Rock outcrop.					
PEC Philder	Cemented pan, seepage, slope.	Thin layer	Cemented pan, slope.	Droughty, rooting depth, slope.	Cemented pan, rooting depth, complex slope.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT ON LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions
PFB*:					
Philder	Cemented pan, seepage, slope.	Thin layer	Cemented pan, slope.	Droughty, rooting depth, slope.	Cemented pan, rooting depth, complex slope.
Armesa	Seepage	Piping, low strength.	Favorable	Erodes easily, soil blowing, excess lime.	Erodes easily, soil blowing.
PGB*:					
Pintura	Seepage	Erodes easily, piping, seepage.	Slope, cutbanks cave.	Slope, soil blowing, fast intake.	Soil blowing, too sandy.
Dona Ana	Seepage, slope.	Low strength, compressible, piping.	Slope	Soil blowing, slope.	Erodes easily, piping, slope.
PHB*:					
Pintura	Seepage	Erodes easily, piping, seepage.	Slope, cutbanks cave.	Slope, soil blowing, fast intake.	Soil blowing, too sandy.
Tome	Favorable	Low strength, piping.	Percs slowly	Erodes easily, percs slowly.	Erodes easily, percs slowly, piping.
Dona Ana	Seepage, slope.	Low strength, compressible, piping.	Favorable	Soil blowing	Erodes easily, piping, slope.
POB Prelo	Favorable	Low strength	Percs slowly, excess salt, slope.	Erodes easily, slope, excess salt.	Erodes easily.
RAB*:					
Reakor	Seepage, slope.	Low strength, piping.	Slope	Slope, erodes easily.	Erodes easily, slope.
Tome	Favorable	Low strength, piping.	Percs slowly	Erodes easily, percs slowly.	Erodes easily, percs slowly, piping.
Tencee	Cemented pan, slope.	Piping, thin layer.	Cemented pan, complex slope.	Droughty, rooting depth, slope.	Cemented pan, complex slope, rooting depth.
REB*:					
Reeves Variant	Seepage	Low strength, erodes easily, piping.	Excess salt	Excess salt	Erodes easily, piping.
Shanta	Seepage	Seepage, piping, low strength.	Slope	Slope, erodes easily.	Favorable.
RFA*:					
Reyab	Favorable	Low strength, piping.	Favorable	Erodes easily	Erodes easily, piping.
Armesa	Seepage	Piping, low strength.	Favorable	Erodes easily, soil blowing, excess lime.	Erodes easily, soil blowing.
ROG*. Rock outcrop					
RPG*: Rock outcrop.					

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT ON LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions
RPG*:					
Deama	Slope, depth to rock.	Thin layer, piping.	Depth to rock, slope.	Droughty, rooting depth, slope.	Depth to rock, rooting depth, slope.
RRF*:					
Rock outcrop.					
Lozier	Depth to rock	Thin layer	Not needed	Rooting depth	Depth to rock.
RTE*:					
Rock outcrop.					
Tortugas	Depth to rock, slope.	Thin layer, piping.	Depth to rock, slope.	Depth to rock, slope.	Depth to rock, slope.
Ustifluvents.					
RUA*:					
Ruidoso	Favorable	Low strength, hard to pack.	Slope, percs slowly.	Slope, percs slowly.	Percs slowly.
SGA*:					
Shanta	Seepage	Shrink-swell, piping.	Floods, slope.	Floods, erodes easily, slope.	Favorable.
Gabaldon	Seepage	Low strength, compressible, piping.	Floods	Floods	Erodes easily, piping.
TAC: Tencee	Cemented pan, slope.	Piping, thin layer.	Cemented pan, complex slope.	Droughty, rooting depth, slope.	Cemented pan, complex slope, rooting depth.
TDB: Tome	Favorable	Low strength, piping.	Percs slowly	Erodes easily, percs slowly.	Erodes easily, percs slowly, piping.
TOE: Tortugas	Depth to rock, slope.	Thin layer, piping.	Depth to rock, slope.	Depth to rock, slope.	Depth to rock, slope.
TPE*, TPG*:					
Tortugas	Depth to rock, slope.	Thin layer, piping.	Depth to rock, slope.	Depth to rock, slope.	Depth to rock, slope.
Deama	Slope, depth to rock.	Thin layer, piping.	Depth to rock, slope.	Droughty, rooting depth, slope.	Depth to rock, rooting depth, slope.

* See map unit description for the composition and behavior of the map unit.

TABLE 14.--WATER MANAGEMENT ON HIGH DETAIL MAP UNITS

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. Absence of an entry means soil was not evaluated]

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions
AbB, AcA Alamogordo	Seepage, slope.	Low strength, piping, excess salt.	Excess salt	Droughty, excess salt.	Piping, rooting depth, slope.
AdB*:					
Alamogordo	Seepage, slope.	Low strength, piping, excess salt.	Excess salt	Droughty, excess salt.	Piping, rooting depth, slope.
Aztec	Seepage, slope.	Hard to pack, seepage, unstable fill.	Slope	Droughty, slope.	Slope, small stones.
AhB*:					
Alamogordo	Seepage, slope.	Low strength, piping, excess salt.	Excess salt	Droughty, excess salt.	Piping, rooting depth, slope.
McCullough	Seepage	Piping	Favorable	Droughty, soil blowing.	Soil blowing.
AkA Alamogordo Variant	Seepage	Piping, low strength, excess salt.	Excess salt	Erodes easily, excess salt, droughty.	Favorable.
AnD Aztec	Seepage, slope.	Hard to pack, seepage, unstable fill.	Slope	Droughty, slope.	Slope, small stones.
AoB*:					
Aztec	Seepage, slope.	Hard to pack, seepage, unstable fill.	Slope	Droughty, slope.	Slope, small stones.
Alamogordo	Seepage, slope.	Low strength, piping, excess salt.	Excess salt	Droughty, excess salt.	Piping, rooting depth, slope.
Gu*. Gullied land					
GyC*, GyE*. Gypsum land					
HbA Holloman	Depth to rock, seepage.	Low strength, piping, excess salt.	Depth to rock, excess salt, complex slope.	Droughty, excess salt, rooting depth.	Depth to rock, rooting depth, complex slope.
HcA*:					
Holloman	Depth to rock, seepage.	Low strength, piping, excess salt.	Depth to rock, excess salt, complex slope.	Droughty, excess salt, rooting depth.	Depth to rock, rooting depth, complex slope.
Gypsum land.					
LbB Largo	Slope, seepage.	Piping, shrink-swell, low strength.	Floods	Erodes easily, floods.	Piping, percs slowly, erodes easily.
LcA Largo	Favorable	Piping, erodes easily, low strength.	Favorable	Favorable	Piping, erodes easily.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT ON HIGH DETAIL MAP UNITS--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions
LdA: Largo	Seepage	Piping, low strength.	Percs slowly	Percs slowly	Piping, percs slowly, erodes easily.
LdB, LdB2: Largo	Slope, seepage.	Piping, low strength.	Percs slowly, slope.	Erodes easily, percs slowly, slope.	Piping, percs slowly, erodes easily.
LeA: Largo	Seepage	Piping, low strength.	Floods	Erodes easily, floods.	Piping, percs slowly, erodes easily.
LfB*:					
Largo	Slope, seepage.	Piping, low strength.	Percs slowly, slope.	Erodes easily, percs slowly, slope.	Piping, percs slowly, erodes easily.
Ogral	Seepage	Hard to pack, piping, seepage.	Slope	Droughty, erodes easily, slope.	Small stones.
McB: McCullough	Seepage	Piping	Favorable	Droughty, soil blowing.	Soil blowing.
MdA: McCullough Variant	Favorable	Low strength, piping, erodes easily.	Percs slowly	Favorable	Erodes easily, piping.
NaC*:					
Nickel	Seepage, slope.	Seepage	Slope	Droughty, slope.	Small stones, slope.
Aztec	Seepage, slope.	Hard to pack, seepage, unstable fill.	Slope	Droughty, slope.	Slope, small stones.
PkA, PlA, PmA: Prelo	Favorable	Low strength	Percs slowly, excess salt.	Excess salt	Erodes easily.
PmB, PmB2: Prelo	Favorable	Low strength	Percs slowly, excess salt, slope.	Erodes easily, slope, excess salt.	Erodes easily.
PnA, PpA: Prelo	Favorable	Low strength	Percs slowly, excess salt.	Excess salt	Erodes easily.
PvB*:					
Prelo	Favorable	Low strength	Percs slowly, excess salt, slope.	Erodes easily, slope, excess salt.	Erodes easily.
Prelo Variant	Seepage	Erodes easily, low strength.	Favorable	Droughty, erodes easily, seepage.	Erodes easily.
RbA, RcB2: Reeves	Seepage, slope.	Thin layer, hard to pack, piping.	Excess salt	Droughty, excess salt.	Slope, erodes easily.
RdA: Reeves	Slope	Piping, low strength.	Excess salt, floods.	Erodes easily, floods, excess salt.	Erodes easily, piping, slope.
TbA: Tobler	Seepage	Erodes easily, low strength, piping.	Floods	Floods	Erodes easily, piping.
TcA, TcB, TeB: Tome	Favorable	Low strength, piping.	Percs slowly	Erodes easily, percs slowly.	Erodes easily, percs slowly, piping.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT ON HIGH DETAIL MAP UNITS--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions
TfB*:					
Tome	Favorable	Low strength, piping.	Percs slowly	Erodes easily, percs slowly.	Erodes easily, percs slowly, piping.
Emot	Seepage	Piping, seepage.	Favorable	Droughty, erodes easily.	Small stones.
TvA*. Torrifluvents					
UaA*. Ustic Torriorthents					

* See map unit description for the composition and behavior of the map unit.

TABLE 15.--RECREATIONAL DEVELOPMENT ON LOW DETAIL MAP UNITS

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry means soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
AEC*:				
Alamogordo	Moderate: dusty.	Moderate: dusty.	Moderate: dusty, slope.	Moderate: dusty.
Gypsum land.				
AGE*:				
Alamogordo	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Gypsum land.				
Aztec	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.
AMC Armesa	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Moderate: dusty.
AZF*:				
Aztec	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Rock outcrop.				
Lozier	Severe: slope.	Severe: slope.	Severe: slope, depth to rock, small stones.	Severe: slope.
BAF*. Badland				
BOA*:				
Bluepoint	Moderate: soil blowing, too sandy.	Moderate: soil blowing, too sandy.	Moderate: soil blowing, too sandy.	Moderate: soil blowing, too sandy.
Onite	Moderate: too sandy, soil blowing.	Moderate: too sandy, soil blowing.	Moderate: slope, too sandy, soil blowing.	Moderate: too sandy, soil blowing.
Wink	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Slight.
BRF Borrego	Severe: slope, percs slowly.	Severe: slope.	Severe: depth to rock, percs slowly, slope.	Severe: slope.
CFA Crowflats	Severe: floods.	Moderate: floods, dusty.	Moderate: floods, dusty.	Moderate: dusty.
DEB Deama	Moderate: large stones, small stones.	Moderate: large stones, small stones.	Severe: depth to rock, large stones, small stones.	Moderate: large stones, small stones.

See footnote at end of table.

TABLE 15.--RECREATIONAL DEVELOPMENT ON LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
DEF-------------------Deama	Severe: slope.	Severe: slope.	Severe: slope, large stones, small stones.	Moderate: slope, large stones, small stones.
DRF*, DRG*:				
Deama-----------------	Severe: slope.	Severe: slope.	Severe: slope, large stones, small stones.	Severe: slope.
Rock outcrop.				
DSF*:				
Deama-----------------	Severe: slope.	Severe: slope.	Severe: slope, large stones, small stones.	Severe: slope.
Rock outcrop.				
Holloman Variant-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
DTB*:				
Dona Ana-------------	Slight---------------	Slight---------------	Moderate: slope.	Slight.
Berino---------------	Slight---------------	Slight---------------	Moderate: slope.	Slight.
DYE*:				
Dye------------------	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Moderate: slope.
Encierro-------------	Moderate: percs slowly, slope, small stones.	Moderate: slope, small stones.	Severe: depth to rock, slope, small stones.	Moderate: small stones.
ECF*:				
Ector----------------	Severe: slope.	Severe: slope.	Severe: slope, depth to rock, small stones.	Severe: slope.
Rock outcrop.				
ESB*:				
Espy-----------------	Moderate: dusty.	Moderate: dusty.	Moderate: dusty, small stones.	Moderate: dusty.
Shanta Variant-------	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.
GZB*:				
Gypsum land.				
Holloman-------------	Moderate: dusty.	Moderate: dusty.	Moderate: depth to rock, dusty, slope.	Moderate: dusty.

See footnote at end of table.

TABLE 15.--RECREATIONAL DEVELOPMENT ON LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
HOB*:				
Holloman	Moderate: dusty.	Moderate: dusty.	Moderate: depth to rock, dusty, slope.	Moderate: dusty.
Gypsum land.				
Yesum	Moderate: dusty.	Moderate: dusty.	Moderate: dusty, slope.	Moderate: dusty.
HPB*:				
Holloman	Moderate: dusty.	Moderate: dusty.	Moderate: depth to rock, dusty.	Moderate: dusty.
Reeves	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.
JAB*:				
Jal	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.
Tome	Severe: floods.	Moderate: floods.	Moderate: percs slowly, dusty.	Moderate: dusty.
JEC*:				
Jerag	Moderate: dusty.	Moderate: dusty.	Severe: cemented pan.	Moderate: dusty.
Philder	Moderate: dusty.	Moderate: dusty.	Severe: cemented pan.	Moderate: dusty.
Armesa	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Moderate: dusty.
LAB* La Fonda	Slight	Slight	Moderate: slope.	Slight.
LDB Largo	Severe: floods.	Moderate: floods, dusty.	Moderate: floods, percs slowly, dusty.	Moderate: dusty.
LGB*:				
Largo	Severe: floods.	Moderate: floods, dusty.	Moderate: floods, slope, dusty.	Moderate: dusty.
Ogral	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Slight.
LOB*:				
Lozier	Moderate: small stones, slope.	Moderate: small stones, slope.	Severe: depth to rock, small stones.	Moderate: slope, small stones.
Rock outcrop.				
LOD*:				
Lozier	Moderate: small stones, slope.	Moderate: small stones, slope.	Severe: slope, depth to rock, small stones.	Moderate: slope, small stones.

See footnote at end of table.

TABLE 15.--RECREATIONAL DEVELOPMENT ON LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
LOD*: Rock outcrop.				
MEA: Mead	Severe: floods, percs slowly, too clayey.	Severe: too clayey.	Severe: percs slowly, too clayey, floods.	Severe: too clayey.
MJA*: Mimbres	Severe: floods.	Moderate: dusty.	Moderate: dusty, floods.	Moderate: dusty.
Jal	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.
MPA*: Mimbres	Severe: floods.	Moderate: dusty.	Moderate: dusty, floods.	Moderate: dusty.
Prelo	Moderate: percs slowly, dusty.	Moderate: dusty.	Moderate: percs slowly, dusty.	Slight.
MTA*: Mimbres	Severe: floods.	Moderate: dusty.	Moderate: dusty, floods.	Moderate: dusty.
Tome	Severe: floods.	Moderate: floods.	Moderate: percs slowly, dusty.	Moderate: dusty.
MXC: Montecito	Moderate: percs slowly.	Slight	Moderate: percs slowly, slope.	Slight.
NTD*: Nickel	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.
Tencee	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: cemented pan, slope, small stones.	Moderate: small stones.
OPB*: Onite	Moderate: too sandy, soil blowing.	Moderate: too sandy, soil blowing.	Moderate: slope, too sandy, soil blowing.	Moderate: too sandy, soil blowing.
Pintura	Severe: soil blowing, too sandy.	Severe: soil blowing, too sandy.	Severe: soil blowing, too sandy.	Severe: soil blowing, too sandy.
PAE*: Pena	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.
Aztec Variant	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.

See footnote at end of table.

TABLE 15.--RECREATIONAL DEVELOPMENT ON LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
PCB*:				
Pena	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
Cale	Slight	Slight	Slight	Slight.
Kerrick	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.
PDF*:				
Pena Variant	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.				
PEC Philder	Moderate: dusty.	Moderate: dusty.	Severe: cemented pan.	Moderate: dusty.
PFB*:				
Philder	Moderate: dusty.	Moderate: dusty.	Severe: cemented pan.	Moderate: dusty.
Armesa	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Moderate: dusty.
PGB*:				
Pintura	Severe: soil blowing, too sandy.	Severe: soil blowing, too sandy.	Severe: soil blowing, too sandy.	Severe: soil blowing, too sandy.
Dona Ana	Slight	Slight	Moderate: slope.	Slight.
PHB*:				
Pintura	Severe: soil blowing, too sandy.	Severe: soil blowing, too sandy.	Severe: soil blowing, too sandy.	Severe: soil blowing, too sandy.
Tome	Severe: floods.	Moderate: floods.	Moderate: percs slowly, slope, dusty.	Moderate: dusty.
Dona Ana	Slight	Slight	Moderate: slope.	Slight.
POB Prelo	Moderate: percs slowly, dusty.	Moderate: dusty.	Moderate: percs slowly, dusty.	Slight.
RAB*:				
Reakor	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Moderate: dusty.
Tome	Severe: floods.	Moderate: floods.	Moderate: percs slowly, slope, dusty.	Moderate: dusty.
Tencee	Moderate: small stones.	Moderate: small stones.	Severe: cemented pan, small stones.	Moderate: small stones.
REB*:				
Reeves Variant	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.

See footnote at end of table.

TABLE 15.--RECREATIONAL DEVELOPMENT ON LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
REB*:				
Shanta	Slight	Slight	Slight	Slight.
RFA*:				
Reyab	Severe: floods.	Moderate: floods, dusty.	Moderate: floods, dusty.	Moderate: dusty.
Armesa	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Moderate: dusty.
ROG*. Rock outcrop				
RPG*:				
Rock outcrop.				
Deama	Severe: slope.	Severe: slope.	Severe: slope, large stones, small stones.	Severe: slope.
RRF*:				
Rock outcrop.				
Lozier	Severe: slope.	Severe: slope.	Severe: slope, depth to rock, small stones.	Severe: slope.
RTE*:				
Rock outcrop.				
Tortugas	Severe: small stones, slope.	Severe: small stones, slope.	Severe: depth to rock, slope, small stones.	Severe: small stones.
Ustifluvents.				
RUA*:				
Ruidoso	Moderate: percs slowly, dusty.	Moderate: dusty.	Moderate: percs slowly, dusty.	Moderate: dusty.
SGA*:				
Shanta	Severe: floods.	Moderate: floods.	Severe: floods.	Moderate: floods.
Gabaldon	Severe: floods.	Moderate: floods.	Moderate: floods.	Slight.
TAC Tencee	Moderate: small stones.	Moderate: small stones.	Severe: cemented pan, small stones.	Moderate: small stones.
TDB Tome	Severe: floods.	Moderate: floods.	Moderate: percs slowly, slope, dusty.	Moderate: dusty.
TOE Tortugas	Severe: small stones, slope.	Severe: small stones, slope.	Severe: depth to rock, slope, small stones.	Severe: small stones.

See footnote at end of table.

TABLE 15.--RECREATIONAL DEVELOPMENT ON LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
TPE*:				
Tortugas	Severe: small stones, slope.	Severe: small stones, slope.	Severe: depth to rock, slope, small stones.	Severe: small stones.
Deama	Severe: slope.	Severe: slope.	Severe: slope, large stones, small stones.	Moderate: slope, large stones, small stones.
TPG*:				
Tortugas	Severe: small stones, slope.	Severe: small stones, slope.	Severe: depth to rock, slope, small stones.	Severe: small stones, slope.
Deama	Severe: slope.	Severe: slope.	Severe: slope, large stones, small stones.	Severe: slope.

* See map unit description for the composition and behavior of the map unit.

TABLE 16.--RECREATIONAL DEVELOPMENT ON HIGH DETAIL MAP UNITS

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry means soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
AbB, AcA: Alamogordo	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.
AdB*:				
Alamogordo	Moderate: dusty.	Moderate: dusty.	Moderate: dusty, slope.	Moderate: dusty.
Aztec	Moderate: soil blowing.	Moderate: soil blowing.	Severe: small stones.	Slight.
AhB*:				
Alamogordo	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.
McCullough	Moderate: too sandy, soil blowing.	Moderate: too sandy, soil blowing.	Moderate: too sandy, soil blowing.	Moderate: too sandy, soil blowing.
AkA: Alamogordo Variant	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.
AnD: Aztec	Moderate: small stones.	Moderate: small stones.	Severe: slope, small stones.	Slight.
AoB*:				
Aztec	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight.
Alamogordo	Moderate: dusty.	Moderate: dusty.	Moderate: dusty, slope.	Moderate: dusty.
Gu*. Gullied land				
GyC*, GyE*. Gypsum land				
HbA: Holloman	Moderate: dusty.	Moderate: dusty.	Moderate: depth to rock, dusty.	Moderate: dusty.
HcA*:				
Holloman	Moderate: dusty.	Moderate: dusty.	Moderate: depth to rock, dusty.	Moderate: dusty.
Gypsum land.				
LbB: Largo	Severe: floods.	Moderate: floods, dusty.	Moderate: floods, slope, dusty.	Moderate: dusty.
LcA: Largo	Moderate: percs slowly, dusty.	Moderate: dusty.	Moderate: percs slowly, dusty.	Moderate: dusty.
LdA: Largo	Moderate: percs slowly, dusty.	Moderate: dusty.	Moderate: dusty, percs slowly.	Moderate: dusty.

See footnote at end of table.

TABLE 16.--RECREATIONAL DEVELOPMENT ON HIGH DETAIL MAP UNITS--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
LdB, LdB2------------- Largo	Moderate: percs slowly, dusty.	Moderate: dusty.	Moderate: slope, dusty, percs slowly.	Moderate: dusty.
LeA------------------ Largo	Severe: floods.	Moderate: floods, dusty.	Moderate: floods, percs slowly, dusty.	Moderate: dusty.
LfB*:				
Largo----------------	Moderate: percs slowly, dusty.	Moderate: dusty.	Moderate: slope, dusty, percs slowly.	Moderate: dusty.
Ogral----------------	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Slight.
McB------------------ McCullough	Moderate: too sandy, soil blowing.	Moderate: too sandy, soil blowing.	Moderate: slope, soil blowing, too sandy.	Moderate: too sandy, soil blowing.
MdA------------------ McCullough Variant	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Moderate.
NaC*:				
Nickel---------------	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
Aztec----------------	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight.
PkA, PlA, PmA, PmB, PmB2, PnA------------ Prelo	Moderate: percs slowly, dusty.	Moderate: dusty.	Moderate: percs slowly, dusty.	Slight.
PpA------------------ Prelo	Severe: floods.	Moderate: dusty, floods.	Moderate: percs slowly, dusty, floods.	Slight.
PvB*:				
Prelo----------------	Moderate: percs slowly, dusty.	Moderate: dusty.	Moderate: percs slowly, dusty.	Slight.
Prelo Variant--------	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.
RbA, RcB2------------ Reeves	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.
RdA------------------ Reeves	Severe: floods.	Moderate: dusty, floods.	Moderate: dusty, floods.	Moderate: dusty.
TbA------------------ Tobler	Severe: floods.	Moderate: floods.	Severe: floods.	Moderate: floods.
TcA------------------ Tome	Moderate: percs slowly, dusty.	Moderate: dusty.	Moderate: percs slowly, dusty.	Moderate: dusty.

See footnote at end of table.

TABLE 16.--RECREATIONAL DEVELOPMENT ON HIGH DETAIL MAP UNITS--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
TcB, TeB-------------- Tome	Severe: floods.	Moderate: floods.	Moderate: percs slowly, slope, dusty.	Moderate: dusty.
TfB*:				
Tome-----------------	Moderate: percs slowly, dusty.	Moderate: dusty.	Moderate: percs slowly, dusty.	Moderate: dusty.
Emot-----------------	Moderate: small stones, dusty.	Moderate: small stones, dusty.	Severe: small stones.	Moderate: small stones.
TvA*. Torrifluvents				
UaA*. Ustic Torriorthents				

* See map unit description for the composition and behavior of the map unit.

TABLE 17.--WILDLIFE HABITAT POTENTIALS ON LOW DETAIL MAP UNITS

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates the soil was not rated]

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
AEC*:											
Alamogordo	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Gypsum land.											
AGE*:											
Alamogordo	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Gypsum land.											
Aztec	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Very poor.	---	Very poor.	Fair.
AMC Armesa	Poor	Fair	Fair	Poor	Fair	Very poor.	Very poor.	Fair	---	---	Fair.
AZF*:											
Aztec	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Very poor.	---	Very poor.	Fair.
Rock outcrop.											
Lozier	Very poor.	Very poor.	Fair	Very poor.	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
BAF*. Badland											
BOA*:											
Bluepoint	Fair	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Fair.
Onite	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
Wink	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
BRF Borrego	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.
CFA Crowflats	Poor	Fair	Fair	---	Fair	Fair	Fair	Fair	---	Fair	Fair.
DEB, DEF Deama	Very poor.	Very poor.	Fair	Poor	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.	Fair.
DRF*, DRG*:											
Deama	Very poor.	Very poor.	Fair	Poor	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.	Fair.
Rock outcrop.											
DSF*:											
Deama	Very poor.	Very poor.	Fair	Poor	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.	Fair.
Rock outcrop.											
Holloman Variant	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.

See footnote at end of table.

TABLE 17.--WILDLIFE HABITAT POTENTIALS ON LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
DTB*:											
Dona Ana	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Poor	---	Very poor.	Poor.
Berino	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Poor	---	Very poor.	Poor.
DYE*:											
Dye	Poor	Poor	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Encierro	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
ECF*:											
Ector	Very poor.	Very poor.	Fair	Very poor.	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Rock outcrop.											
ESB*:											
Espy	Poor	Poor	Fair	---	Fair	Poor	Poor	Poor	---	Poor	Fair.
Shanta Variant	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
GZB*:											
Gypsum land.											
Holloman	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
HOB*:											
Holloman	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
Gypsum land.											
Yesum	Very poor.	Very poor.	Poor	--	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
HPB*:											
Holloman	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
Reeves	Very poor.	Very poor.	Fair	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
JAB*:											
Jal	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Very poor.	---	Very poor.	Poor.
Tome	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Very poor.	---	Very poor.	Poor.
JEC*:											
Jerag	Poor	Fair	Fair	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
Philder	Poor	Fair	Fair	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
Armesa	Poor	Fair	Fair	Poor	Fair	Very poor.	Very poor.	Fair	---	---	Fair.
LAB* La Fonda	Poor	Fair	Fair	---	Poor	Poor	Very poor.	Poor	---	Very poor.	Fair.

See footnote at end of table.

TABLE 17.--WILDLIFE HABITAT POTENTIALS ON LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Conif- erous plants	Shrubs	Wetland plants	Shallow water areas	Open- land wild- life	Wood- land wild- life	Wetland wild- life	Range- land wild- life
LDB----------------- Largo	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Very poor.	---	Very poor.	Poor.
LGB*:											
Largo--------------	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Very poor.	---	Very poor.	Poor.
Ogral--------------	Very poor.	Very poor.	Poor	Poor	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
LOB*, LOD*:											
Lozier-------------	Very poor.	Very poor.	Fair	Very poor.	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Rock outcrop.											
MEA----------------- Mead	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor	Fair	Very poor.	Very poor.	Fair	Very poor.
MJA*:											
Mimbres------------	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
Jal----------------	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Very poor.	---	Very poor.	Poor.
MPA*:											
Mimbres------------	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
Prelo--------------	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
MTA*:											
Mimbres------------	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
Tome---------------	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Very poor.	---	Very poor.	Poor.
MXC----------------- Montecito	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.	Fair.
NTD*:											
Nickel-------------	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
Tencee-------------	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
OPB*:											
Onite--------------	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
Pintura------------	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
PAE*:											
Pena---------------	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Aztec Variant------	Poor	Poor	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
PCB*:											
Pena---------------	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.

See footnote at end of table.

TABLE 17.--WILDLIFE HABITAT POTENTIALS ON LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
PCB*:											
Cale	Poor	Fair	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
Kerrick	Fair	Fair	Fair	Very poor.	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
PDF*:											
Pena Variant	Very poor.	Very poor.	Fair	Poor	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Rock outcrop.											
PEC Philder	Poor	Fair	Fair	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
PFB*:											
Philder	Poor	Fair	Fair	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
Armesa	Poor	Fair	Fair	Poor	Fair	Very poor.	Very poor.	Fair	---	---	Fair.
PGB*:											
Pintura	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Dona Ana	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Poor	---	Very poor.	Poor.
PHB*:											
Pintura	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Tome	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Very poor.	---	Very poor.	Poor.
Dona Ana	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Poor	---	Very poor.	Poor.
POB Prelo	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
RAB*:											
Reakor	Very poor.	Very poor.	Fair	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
Tome	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Very poor.	---	Very poor.	Poor.
Tencee	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
REB*:											
Reeves Variant	Poor	Fair	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
Shanta	Poor	Fair	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
RFA*:											
Reyab	Poor	Fair	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
Armesa	Poor	Fair	Fair	Poor	Fair	Very poor.	Very poor.	Fair	---	---	Fair.

See footnote at end of table.

TABLE 17.--WILDLIFE HABITAT POTENTIALS ON LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
ROG*. Rock outcrop											
RPG*: Rock outcrop.											
Deama	Very poor.	Very poor.	Fair	Poor	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.	Fair.
RRF*: Rock outcrop.											
Lozier	Very poor.	Very poor.	Fair	Very poor.	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
RTE*: Rock outcrop.											
Tortugas	Poor	Poor	Fair	---	Fair	Very poor.	Very poor.	Poor	Poor	---	Fair.
Ustifluvents.											
RUA*: Ruidoso	Poor	Poor	Good	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
SGA*: Shanta	Poor	Fair	Fair	---	Fair	Fair	Fair	Fair	---	Fair	Fair.
Gabaldon	Poor	Fair	Good	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
TAC Tencee	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
TDB Tome	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Very poor.	---	Very poor.	Poor.
TOE Tortugas	Poor	Poor	Fair	---	Fair	Very poor.	Very poor.	Poor	Poor	---	Fair.
TPE*: Tortugas	Poor	Poor	Fair	---	Fair	Very poor.	Very poor.	Poor	Poor	---	Fair.
Deama	Very poor.	Very poor.	Fair	Poor	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.	Fair.
TPG*: Tortugas	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Very poor.	Poor	---	Fair.
Deama	Very poor.	Very poor.	Fair	Poor	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.	Fair.

* See map unit description for the composition and behavior of the map unit.

TABLE 18.--WILDLIFE HABITAT POTENTIALS ON HIGH DETAIL MAP UNITS

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates the soil was not rated]

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
AbB, AcA----------- Alamogordo	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
AdB*:											
Alamogordo--------	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Aztec-------------	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Very poor.	---	Very poor.	Fair.
AhB*:											
Alamogordo--------	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
McCullough--------	Very poor.	Poor	Fair	Poor	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
AkA---------------- Alamogordo Variant	Fair	Fair	Fair	---	Fair	Fair	Fair	Fair	---	Fair	---
AnD---------------- Aztec	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Very poor.	---	Very poor.	Fair.
AoB*:											
Aztec-------------	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Very poor.	---	Very poor.	Fair.
Alamogordo--------	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Gu*. Gullied land											
GyC*, GyE*. Gypsum land											
HbA---------------- Holloman	Poor	Poor	Fair	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
HcA*:											
Holloman----------	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
Gypsum land.											
LbB---------------- Largo	Good	Good	Good	---	Poor	Good	Fair	Good	---	Fair	---
LcA---------------- Largo	Good	Good	Fair	---	Fair	Good	Good	Good	---	Good	---
LdA, LdB, LdB2----- Largo	Good	Good	Good	---	Poor	Good	Fair	Good	---	Fair	---
LeA---------------- Largo	Poor	Poor	Poor	---	Poor	Poor	Very poor.	Poor	---	Very poor.	Poor.
LfB*:											
Largo-------------	Good	Good	Good	---	Poor	Good	Fair	Good	---	Fair	---
Ogral-------------	Fair	Good	Fair	Fair	Good	Poor	Poor	Fair	---	Poor	---

See footnote at end of table.

TABLE 18.--WILDLIFE HABITAT POTENTIALS ON HIGH DETAIL MAP UNITS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
McB: McCullough	Good	Good	Fair	Good	Good	Poor	Poor	Good	---	Poor	---
MdA: McCullough Variant	Good	Good	Fair	---	Good	Good	Good	Good	---	Good	---
NaC*:											
Nickel	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
Aztec	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Very poor.	---	Very poor	Fair.
PkA, PlA, PmA: Prelo	Good	Good	Good	---	Good	Good	Good	Good	---	Good	---
PmB, PmB2: Prelo	Good	Good	Good	---	Good	Good	Fair	Good	---	Fair	---
PnA, PpA: Prelo	Good	Good	Good	---	Good	Good	Good	Good	---	Good	---
PvB*:											
Prelo	Good	Good	Good	---	Good	Good	Fair	Good	---	Fair	---
Prelo Variant	Good	Good	Good	---	Good	Fair	Fair	Good	---	Fair	---
RbA, RcB2: Reeves	Fair	Good	Fair	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
RdA: Reeves	Poor	Poor	Fair	---	Poor	Poor	Very poor.	Poor	---	Very poor.	Fair.
TbA: Tobler	Good	Good	Good	---	Good	Poor	Poor	Good	---	Poor	Good.
TcA: Tome	Good	Good	Fair	---	Poor	Good	Good	Good	---	Good	---
TcB, TeB: Tome	Good	Good	Fair	---	Poor	Fair	Fair	Fair	---	Fair	---
TfB*:											
Tome	Good	Good	Fair	---	Poor	Fair	Fair	Fair	---	Fair	---
Emot	Fair	Good	Fair	Fair	Good	Poor	Poor	Fair	---	Poor	---
TvA*. Torrifluvents											
UaA*. Ustic Torriorthents											

* See map unit description for the composition and behavior of the map unit.

TABLE 19.--ENGINEERING PROPERTIES AND CLASSIFICATIONS OF SOILS IN LOW DETAIL MAP UNITS

[The symbol < means less than; > means greater than. Absence of an entry means data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
AEC*:											
Alamogordo**	0-7	Very fine sandy loam.	ML, SM, GM	A-4, A-2	0	50-100	45-90	35-85	25-60	20-30	NP-5
	7-15	Loam, very fine sandy loam, fine sandy loam.	ML	A-4	0	95-100	90-100	70-95	50-75	20-30	NP-5
	15-60	Loam, very fine sandy loam, fine sandy loam.	SM, ML	A-4	0	95-100	90-100	70-100	45-75	25-35	NP-10
Gypsum land.											
AGE*:											
Alamogordo**	0-6	Fine sandy loam	ML, SM, GM	A-4, A-2	0	50-100	45-90	35-85	25-60	20-30	NP-5
	6-26	Loam, very fine sandy loam, fine sandy loam.	ML	A-4	0	95-100	90-100	70-95	50-75	20-30	NP-5
	26-60	Loam, very fine sandy loam, fine sandy loam.	SM, ML	A-4	0	95-100	90-100	70-100	45-75	25-35	NP-10
Gypsum land.											
Aztec**	0-5	Sandy loam	SM	A-2, A-4	0-5	45-90	40-85	35-65	20-50	---	NP
	5-16	Gravelly sandy loam, gravelly fine sandy loam.	GM, SM	A-1, A-2, A-4	0-5	60-75	55-70	35-60	20-40	---	NP
	16-31	Very gravelly sandy loam, gravelly sandy loam, very gravelly fine sandy loam.	GM	A-1, A-2	0-5	45-60	40-55	25-45	15-30	---	NP
	31-60	Very gravelly sandy loam, very gravelly loamy sand.	GP-GM, GM	A-1	0-5	25-55	20-50	10-35	5-15	---	NP
AMC Armesa	0-3	Very fine sandy loam.	ML, SM	A-4	0	95-100	95-100	60-85	45-65	20-30	NP-5
	3-14	Sandy clay loam, loam.	SM-SC, SC, CL-ML, CL	A-4, A-6	0	100	95-100	60-80	40-60	25-35	NP-15
	14-31	Silty clay loam, silt loam.	CL-ML, CL	A-4, A-6	0	100	95-100	90-95	75-85	20-35	5-15
	31-60	Gravelly sandy clay loam, gravelly silt loam, gravelly silty clay loam.	CL-ML, CL	A-2, A-4, A-6	0	75-100	70-100	65-95	50-85	20-35	5-15

See footnote at end of table.

TABLE 19.--ENGINEERING PROPERTIES AND CLASSIFICATIONS OF SOILS IN LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
AZF*:											
Aztec	0-4	Gravelly loam	SM	A-1, A-2, A-4	0-5	70-80	65-75	40-65	20-50	---	NP
	4-16	Gravelly loam, gravelly fine sandy loam.	GM, SM	A-1, A-2, A-4	0-5	60-75	55-70	35-60	20-40	---	NP
	16-26	Very gravelly sandy loam, gravelly sandy loam, very gravelly fine sandy loam.	GM	A-1, A-2	0-5	45-60	40-55	25-45	15-30	---	NP
	26-60	Very gravelly sandy loam, very gravelly loamy sand.	GP-GM, GM	A-1	0-5	25-55	20-50	10-35	5-20	---	NP
Rock outcrop.											
Lozier	0-7	Gravelly loam	GC, SC, CL	A-2, A-4, A-6	5-25	45-80	40-75	35-70	20-60	25-35	10-15
	7-15	Extremely gravelly silty clay loam.	GC	A-2	5-25	25-50	20-45	20-40	10-20	30-40	15-25
	15-20	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
BAF*. Badland											
BOA*:											
Bluepoint	0-8	Loamy fine sand	SM	A-2	0	90-100	90-100	75-85	20-35	---	NP
	8-60	Loamy fine sand, loamy sand, fine sand.	SM	A-2	0	90-100	90-100	70-80	15-25	---	NP
Onite	0-10	Loamy fine sand	SM	A-2	0	100	100	50-95	15-35	---	NP
	10-30	Sandy loam, gravelly sandy loam.	SM	A-2	0	100	100	75-95	15-35	---	NP
	30-60	Loamy sand, gravelly sandy loam, sandy loam.	SM	A-1, A-2	0	65-100	95-100	50-85	10-35	---	NP
Wink	0-2	Loamy fine sand	SM, SM-SC	A-2-4	0-5	90-100	90-100	80-100	15-35	---	NP-6
	2-18	Sandy loam, loam.	SM, SM-SC	A-2-4, A-4	0-5	90-100	90-100	80-100	25-45	15-25	NP-10
	18-60	Sandy loam	SM, SM-SC	A-2-4, A-4	0-5	90-100	90-100	80-100	15-45	15-45	NP-10
BRF Borrego	0-5	Cobbly loam	CL-ML, CL	A-4, A-6	10-20	80-95	75-90	65-85	50-65	25-35	5-15
	5-16	Gravelly clay, clay.	CL, CH	A-7	0	80-100	70-90	65-85	55-80	45-55	20-30
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
CFA Crowflats	0-4	Silt loam	ML	A-4	0	100	100	95-100	70-95	25-35	NP-10
	4-60	Stratified very fine sandy loam to silt loam.	ML	A-4	0	100	100	95-100	80-95	25-35	NP-10
DEB, DEF Deama	0-15	Gravelly loam	GM	A-2, A-4	5-15	50-70	40-60	35-55	25-45	25-40	NP-10
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 19.--ENGINEERING PROPERTIES AND CLASSIFICATIONS OF SOILS IN LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
DRF*:											
Deama	0-14	Very gravelly loam.	GM	A-2, A-4	5-15	50-70	40-60	35-55	25-45	25-40	NP-10
	14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
DRG*:											
Deama	0-14	Cobbly loam	GM, ML	A-4	30-50	60-80	55-75	50-75	40-60	25-40	NP-10
	14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
DSF*:											
Deama	0-14	Very gravelly loam.	GM	A-2, A-4	5-15	50-70	40-60	35-55	25-45	25-40	NP-10
	14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
Holloman Variant	0-12	Gravelly loam	SM, ML	A-4	0	65-80	60-75	50-70	35-55	20-30	NP-5
	12	Weathered bedrock.	---	---	---	---	---	---	---	---	---
DTB*:											
Dona Ana	0-3	Fine sandy loam	SM	A-2, A-4	0	95-100	90-100	80-100	30-50	15-25	NP-5
	3-37	Sandy clay loam	SC, SM-SC	A-6, A-4	0	95-100	90-100	80-90	35-50	20-35	NP-15
	37-60	Sandy loam	SM-SC, SM	A-2, A-4	0	95-100	90-100	60-75	30-45	20-35	5-10
Berino	0-3	Sandy loam	SM	A-2, A-4	0	90-100	95-100	60-95	30-50	---	NP
	3-60	Sandy clay loam	SC, SM-SC, CL	A-6, A-4	0	90-100	95-100	65-80	35-55	20-35	5-15
DYE*:											
Dye**	0-1	Clay loam	CL	A-6	0	65-100	60-100	55-100	50-80	30-40	10-20
	1-17	Clay	CH	A-7	0	95-100	85-95	80-90	75-85	55-65	30-40
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Encierro	0-2	Clay loam	CL-ML, CL	A-4, A-6	0	70-95	65-90	60-90	50-70	25-40	5-15
	2-13	Clay loam, clay, gravelly clay.	CL, SC, CH	A-6, A-7	0-5	70-100	65-100	60-100	45-85	35-55	15-25
	13	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
ECF*:											
Ector	0-17	Gravelly loam	GC, SC	A-2, A-4, A-6	5-25	40-70	35-65	30-60	20-50	25-35	5-15
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
ESB*:											
Espy	0-17	Loam	SC, CL	A-6, A-7	0-2	80-98	75-95	50-70	40-65	35-50	15-30
	17-22	Indurated	---	---	---	---	---	---	---	---	---
	22-60	Extremely gravelly silt loam.	GM	A-2	0-5	20-45	15-40	10-35	10-20	20-30	NP-10
Shanta Variant	0-12	Silt loam	ML	A-4	0	100	100	85-95	60-90	20-30	NP-5
	12-60	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-85	25-35	5-15

See footnote at end of table.

TABLE 19.--ENGINEERING PROPERTIES AND CLASSIFICATIONS OF SOILS IN LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
GZB*: Gypsum land.											
Holloman----------	0-8	Very fine sandy loam.	CL-ML, CL, ML	A-4, A-6	0	100	100	85-95	55-75	20-35	NP-15
	8	Weathered bedrock.	---	---	---	---	---	---	---	---	---
HOB*: Holloman----------	0-16	Very fine sandy loam.	CL-ML, CL, ML	A-4, A-6	0	100	100	85-95	55-75	20-35	NP-15
	16	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Gypsum land.											
Yesum-------------	0-3	Very fine sandy loam.	ML	A-4	0	100	95-100	85-95	50-65	---	NP
	3-65	Gypsiferous material.	---	---	---	---	---	---	---	---	---
HPB*: Holloman----------	0-12	Very fine sandy loam.	CL-ML, CL, ML	A-4, A-6	0	100	100	85-95	55-75	20-35	NP-15
	12	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Reeves------------	0-4	Silt loam-------	CL-ML, ML	A-4	0	100	100	90-100	60-75	20-35	NP-10
	4-24	Clay loam, silt loam.	CL-ML, CL	A-4, A-6	0	100	100	85-100	60-80	20-30	5-15
	24-35	Loam, silt loam	ML	A-4	0	100	95-100	80-95	55-75	20-30	NP-5
	35-60	Silt loam, very fine sandy loam.	CL, CL-ML	A-4	0	100	100	90-100	60-80	20-30	NP-10
JAB*: Jal---------------	0-12	Silt loam-------	ML	A-4	0	100	100	85-95	70-80	20-30	NP-5
	12-60	Loam, clay loam, silt loam.	ML, CL	A-4, A-6	0	85-100	80-100	70-95	50-75	30-40	5-15
Tome--------------	0-6	Very fine sandy loam.	ML	A-4	0	100	100	90-100	50-80	20-30	NP-5
	6-60	Stratified very fine sandy loam to clay loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	75-85	25-35	5-15
JEC*: Jerag-------------	0-3	Fine sandy loam	SM, ML	A-4	0	100	100	95-100	45-60	20-30	NP-5
	3-9	Loam, clay loam, sandy clay loam.	SM-SC, SC, CL-ML, CL	A-4, A-6	0	85-100	80-100	75-95	35-70	25-35	5-15
	9-19	Gravelly loam, gravelly silt loam.	GM, SM	A-2, A-4	0-10	50-70	45-65	40-60	25-50	25-35	NP-10
	19-25	Indurated-------	---	---	---	---	---	---	---	---	---
	25-60	Gravelly silt loam, gravelly loam, very gravelly loam.	GM	A-1, A-2, A-4	0-15	30-65	25-60	20-60	15-50	25-35	NP-10

See footnote at end of table.

TABLE 19.--ENGINEERING PROPERTIES AND CLASSIFICATIONS OF SOILS IN LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
JEC*:											
Philder	0-4	Very fine sandy loam.	SM, ML	A-4	0	90-100	85-100	80-100	35-65	15-25	NP-5
	4-12	Gravelly sandy clay loam, sandy clay loam, gravelly loam.	SM	A-2, A-4	0-5	70-100	65-95	55-85	30-50	15-25	NP-5
	12-18	Extremely gravelly silt loam, very gravelly loam.	GM	A-1	0-10	25-45	15-40	15-35	10-20	15-25	NP-5
	18-29	Indurated	---	---	---	---	---	---	---	---	---
	29-60	Very gravelly silt loam, very gravelly loam.	GM	A-1	15-30	30-45	25-40	20-35	10-20	15-25	NP-5
Armesa	0-3	Very fine sandy loam.	ML, SM	A-4	0	95-100	95-100	60-85	45-65	20-30	NP-5
	3-18	Sandy clay loam, loam.	SM-SC, SC, CL-ML, CL	A-4, A-6	0	100	95-100	60-85	40-60	25-35	5-15
	18-60	Silty clay loam, silt loam.	CL-ML, CL	A-4, A-6	0	100	95-100	90-95	75-85	20-35	5-15
LAB* La Fonda	0-2	Loam	CL-ML, CL	A-4	0	100	100	80-95	60-80	20-30	5-10
	2-60	Loam, clay loam	CL	A-6	0	95-100	95-100	80-100	60-80	25-35	10-15
LDB Largo	0-4	Silt loam	CL-ML, CL	A-4	0	100	100	95-100	75-90	20-30	5-10
	4-21	Silt loam, very fine sandy loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	80-95	25-35	5-15
	21-60	Loam, silt loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	75-95	25-35	5-15
LGB*:											
Largo**	0-6	Silt loam	CL-ML, CL	A-4	0	100	100	95-100	75-90	20-30	5-10
	6-24	Silt loam, very fine sandy loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	80-95	25-35	5-15
	24-60	Loam, silt loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	70-95	25-35	5-15
Ogral**	0-6	Very fine sandy loam.	SM	A-4	0	100	65-100	50-95	40-65	20-30	NP-5
	6-18	Fine sandy loam, sandy loam.	SM, ML	A-2, A-4	0	90-100	85-100	55-80	25-55	20-30	NP-5
	18-60	Very gravelly fine sandy loam, very gravelly sandy loam.	GP-GM, GM	A-1	0	25-50	20-45	15-40	5-25	20-30	NP-5
LOB*:											
Lozier	0-15	Gravelly loam	GC, SC	A-2, A-4, A-6	5-25	25-60	20-55	20-50	15-45	25-35	5-15
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											

See footnote at end of table.

TABLE 19.--ENGINEERING PROPERTIES AND CLASSIFICATIONS OF SOILS IN LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
LOD*:											
Lozier	0-15	Very gravelly loam.	GC, GM-GC	A-2, A-4, A-6	10-35	30-60	25-55	20-50	15-45	25-35	5-15
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
MEA Mead	0-5	Clay loam	CL	A-7, A-6	0	95-100	75-100	70-85	50-60	35-45	15-20
	5-60	Clay, silty clay	ML, MH	A-7	0	100	100	95-100	85-95	40-55	15-25
MJA*:											
Mimbres	0-12	Silt loam	CL-ML, CL	A-4, A-6	0	100	100	95-100	75-90	20-35	5-15
	12-36	Silty clay loam, silt loam, clay loam.	CL	A-6, A-7	0	100	100	90-100	75-95	25-45	10-25
	36-60	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	95-100	80-100	75-95	30-45	10-25
Jal	0-4	Silt loam	ML	A-4	0	100	100	85-95	70-80	20-30	NP-5
	4-60	Loam, clay loam, silt loam.	ML, CL	A-4, A-6	0	85-100	80-100	70-95	50-75	30-40	5-15
MPA*:											
Mimbres	0-6	Very fine sandy loam.	ML	A-4	0	100	100	85-95	50-65	20-30	NP-5
	6-29	Silty clay loam, silt loam, clay loam.	CL	A-6, A-7	0	100	100	90-100	75-95	25-45	10-25
	29-60	Silty clay loam, silt loam.	CL	A-6, A-7	0	90-100	90-100	80-100	75-95	30-45	10-25
Prelo	0-8	Silt loam	CL-ML, CL	A-4, A-6	0	100	100	90-100	70-95	20-30	5-15
	8-32	Silty clay loam, silt loam, clay loam.	CL	A-6, A-7	0	100	100	95-100	75-95	30-45	10-20
	32-60	Silty clay loam, clay loam.	CL	A-6	0	100	100	95-100	75-95	30-40	10-20
MTA*:											
Mimbres	0-6	Silt loam	CL-ML, CL	A-4, A-6	0	100	100	95-100	70-90	20-35	5-15
	6-25	Silty clay loam, silt loam, clay loam.	CL	A-6, A-7	0	100	100	90-100	75-95	25-45	10-25
	25-60	Silty clay loam, silt loam.	CL	A-6, A-7	0	90-100	90-100	80-100	75-95	30-45	10-25
Tome	0-5	Silt loam	ML	A-4	0	100	100	90-100	50-80	20-30	NP-5
	5-60	Stratified very fine sandy loam and silt loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	75-85	25-35	5-15
MXC Montecito	0-3	Loam	SM-SC, SM, CL-ML, ML	A-4	0	100	100	70-95	40-75	25-35	5-10
	3-62	Clay loam, clay	CL, CH	A-6, A-7	0-10	85-100	80-100	75-100	70-95	35-55	15-30

See footnote at end of table.

TABLE 19.--ENGINEERING PROPERTIES AND CLASSIFICATIONS OF SOILS IN LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
NTD*:											
Nickel------------	0-5	Gravelly very sandy loam.	GM, ML, SM	A-1, A-2, A-4	0-10	55-80	50-75	40-70	20-55	---	NP
	5-17	Very gravelly sandy loam, very gravelly fine sandy loam, gravelly sandy loam.	GP-GM, GM, SP-SM, SM	A-1	0-10	20-60	15-55	15-35	5-15	---	NP
	17-60	Very gravelly sandy loam, very gravelly fine sandy loam, gravelly sandy loam.	GP-GM, GM, SP-SM, SM	A-1	0-10	20-60	15-55	15-35	5-15	---	NP
Tencee------------	0-15	Very gravelly sandy loam.	GM, GP-GM	A-1	0-25	35-55	25-50	15-40	5-20	20-30	NP-5
	15-25	Indurated--------	---	---	---	---	---	---	---	---	---
	25-60	Extremely cobbly loam.	GM, GP-GM	A-2	25-50	25-55	20-50	15-35	5-15	20-30	5-10
OPB*:											
Onite-------------	0-10	Loamy fine sand	SM	A-2	0	100	100	50-95	15-35	---	NP
	10-30	Sandy loam, gravelly sandy loam.	SM	A-2	0	100	100	70-95	15-35	---	NP
	30-60	Loamy sand, gravelly sandy loam, sandy loam.	SM	A-1, A-2	0	100	95-100	50-85	10-35	---	NP
Pintura-----------	0-60	Loamy fine sand	SP-SM, SM	A-3, A-2	0	100	100	80-100	5-25	---	NP
PAE*:											
Pena--------------	0-7	Loam-------------	CL-ML, CL	A-4, A-6	0-5	85-100	80-95	70-95	50-85	25-35	5-15
	7-16	Cobbly sandy clay loam, very gravelly clay loam, gravelly loam.	GC, SM-SC, SC, GM-GC	A-2, A-4, A-6	25-55 0-15	55-75	50-75	35-65	30-45	25-35	5-15
	16-60	Very cobbly loam, very gravelly loam, very gravelly silt loam.	GM	A-1, A-2, A-4	15-35	40-75	35-70	30-65	20-50	20-30	NP-5
Aztec Variant-----	0-8	Gravelly fine sandy loam.	GM, SM	A-1, A-2	0-5	55-65	50-60	30-50	15-30	---	NP
	8-31	Very gravelly sandy loam, very gravelly fine sandy loam.	GP-GM, GM	A-1	0-5	40-55	35-50	25-40	10-25	---	NP
	31-60	Very gravelly sandy loam, very gravelly fine sandy loam.	GP-GM, GM	A-1	0-5	40-55	35-50	25-40	10-25	---	NP

See footnote at end of table.

TABLE 19.--ENGINEERING PROPERTIES AND CLASSIFICATIONS OF SOILS IN LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
PCB*:											
Pena----------------	0-9	Silty clay loam	CL-ML, CL	A-4, A-6	0-5	85-100	80-95	70-95	50-85	25-35	5-15
	9-14	Cobbly sandy clay loam, very gravelly clay loam, gravelly loam.	GC, SM-SC, SC, GM-GC	A-2, A-4, A-6	0-15	55-75	50-75	35-65	30-45	25-35	5-15
	14-60	Very cobbly loam, very gravelly loam, very gravelly silt loam.	GM	A-1, A-2, A-4	15-35	40-75	35-70	30-65	20-50	20-30	NP-5
Cale----------------	0-6	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	90-100	75-95	25-40	5-20
	6-33	Silty clay loam, clay loam.	CL	A-6, A-7	0	100	100	90-100	80-95	30-45	10-25
	33-60	Silty clay loam, loam, clay loam.	CL-ML, CL	A-4, A-6	0	100	100	85-100	80-95	25-40	5-20
Kerrick------------	0-9	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	80-100	55-75	20-35	5-17
	9-25	Loam, clay loam, silty clay loam.	CL	A-6	0-2	95-100	90-100	80-100	60-80	25-40	5-20
	25-60	Indurated--------	---	---	---	---	---	---	---	---	---
PDF*:											
Pena Variant------	0-12	Loam-------------	ML, CL	A-4, A-6	0-5	85-100	80-95	75-85	50-65	30-40	5-15
	12-25	Very gravelly loam, very gravelly clay loam.	GC	A-2, A-6	0-5	45-55	40-50	35-45	25-40	30-40	10-20
	25-60	Extremely gravelly sandy loam.	GP-GM	A-1	0-5	20-35	15-30	10-20	5-10	---	NP
Rock outcrop.											
PEC----------------- Philder	0-4	Very fine sandy loam.	SM, ML	A-4	0	75-95	70-90	65-85	25-55	15-25	NP-5
	4-12	Gravelly sandy clay loam, sandy clay loam, gravelly loam.	SM	A-2, A-4	0-5	70-100	65-95	55-85	30-50	15-25	NP-5
	12-18	Extremely gravelly silt loam, very gravelly loam.	GM	A-1	0-10	25-45	15-40	15-35	10-20	15-25	NP-5
	18-29	Indurated--------	---	---	---	---	---	---	---	---	---
	29-60	Very gravelly silt loam, very gravelly loam.	GM	A-1	15-30	30-45	25-40	20-35	10-20	15-25	NP-5
PFB*:											
Philder------------	0-4	Very fine sandy loam.	SM, ML	A-4	0	90-100	85-100	80-100	35-65	15-25	NP-5
	4-12	Gravelly sandy clay loam, sandy clay loam, gravelly loam.	SM	A-2, A-4	0-5	70-100	65-95	55-85	30-50	15-25	NP-5
	12-18	Extremely gravelly silt loam, very gravelly loam.	GM	A-1	0-10	25-45	15-40	15-35	10-20	15-25	NP-5
	18-29	Indurated--------	---	---	---	---	---	---	---	---	---
	29-60	Very gravelly silt loam, very gravelly loam.	GM	A-1	15-30	30-45	25-40	20-35	10-20	15-25	NP-5

See footnote at end of table.

TABLE 19.--ENGINEERING PROPERTIES AND CLASSIFICATIONS OF SOILS IN LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
PFB*:											
Armesa-------------	0-3	Very fine sandy loam.	ML	A-4	0	95-100	95-100	80-95	50-65	20-30	NP-5
	3-18	Silt loam.	CL-ML, CL CL-ML, CL	A-4, A-6	0	100	95-100	85-95	65-80	25-35	5-15
	18-60	Silty clay loam, silt loam.	CL-ML, CL	A-4, A-6	0	100	95-100	90-95	65-80	20-35	5-15
PGB*:											
Pintura------------	0-60	Loamy fine sand	SP-SM, SM	A-3, A-2	0	100	100	70-95	5-25	---	NP
Dona Ana-----------	0-3	Fine sandy loam	SM	A-2, A-4	0	95-100	90-100	80-100	30-50	15-25	NP-5
	3-37	Sandy clay loam	SC, SM-SC	A-6, A-4	0	95-100	90-100	80-90	35-50	25-40	5-15
	37-60	Sandy loam------	SM-SC, SM	A-2, A-4	0	95-100	90-100	60-75	30-45	20-35	5-10
PHB*:											
Pintura------------	0-60	Loamy fine sand	SP-SM, SM	A-3, A-2	0	100	100	70-95	5-25	---	NP
Tome---------------	0-5	Very fine sandy loam.	ML	A-4	0	100	100	90-100	50-80	20-30	NP-5
	5-60	Stratified very fine sandy loam to silty clay loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	75-85	25-35	5-15
Dona Ana-----------	0-3	Fine sandy loam	SM	A-2, A-4	0	95-100	90-100	80-100	30-50	15-25	NP-5
	3-37	Sandy clay loam	SC, SM-SC	A-6, A-4	0	95-100	90-100	80-90	35-50	25-40	5-15
	37-60	Sandy loam------	SM-SC, SM	A-2, A-4	0	95-100	90-100	60-75	30-45	20-35	5-10
POB---------------- Prelo	0-8	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	90-100	70-95	20-30	5-15
	8-32	Silty clay loam, silt loam, clay loam.	CL	A-6, A-7	0	100	100	95-100	75-95	30-45	10-20
	32-50	Silty clay loam, clay loam.	CL	A-6	0	100	100	95-100	75-95	30-40	10-20
RAB*:											
Reakor-------------	0-4	Silt loam--------	CL-ML	A-4	0	100	100	90-100	70-85	20-30	5-10
	4-60	Clay loam, silt loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	100	100	90-100	75-90	25-35	5-15
Tome---------------	0-6	Silt loam--------	ML	A-4	0	100	100	90-100	50-80	20-30	NP-5
	6-60	Stratified very fine sandy loam and silt loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	75-85	25-35	5-15
Tencee-------------	0-15	Very gravelly sandy loam.	GM, GP-GM	A-1	0-25	35-50	25-45	15-40	5-20	20-30	NP-5
	15-25	Indurated--------	---	---	---	---	---	---	---	---	---
	25-60	Extremely cobbly loam.	GM, GP-GM	A-2	25-50	25-55	20-50	15-35	5-15	20-30	5-15
REB*:											
Reeves Variant-----	0-7	Very fine sandy loam.	ML	A-4	0	100	100	90-100	60-75	20-30	NP-5
	7-12	Loam-------------	ML	A-4	0	100	100	85-95	65-75	20-30	NP-5
	12-16	Silt loam--------	ML	A-4	0	100	100	90-100	70-85	20-30	NP-5
	16-29	Loam, silt loam	ML	A-4	0	100	100	90-100	70-85	20-30	NP-5
	29-60	Clay loam, loam	ML, CL	A-4, A-6	0	100	100	90-100	70-85	30-40	5-15
Shanta-------------	0-13	Loam-------------	ML	A-4	0	80-100	75-100	65-95	50-70	<30	NP-5
	13-27	Silt loam, loam	CL-ML, CL	A-4, A-6	0	80-100	75-100	65-95	50-80	20-30	5-15
	27-60	Sandy clay loam, loam, sandy loam.	SC, SM-SC, CL, CL-ML	A-2, A-4, A-6	0-5	80-100	75-100	50-95	30-65	20-30	5-15

See footnote at end of table.

TABLE 19.--ENGINEERING PROPERTIES AND CLASSIFICATIONS OF SOILS IN LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
RFA*:											
Reyab	0-4	Loam	ML	A-4	0	100	100	85-100	75-95	20-35	NP-10
	4-60	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	100	100	90-100	80-95	25-40	5-15
Armesa	0-3	Very fine sandy loam.	ML, SM	A-4	0	95-100	95-100	60-85	45-65	20-30	NP-5
	3-18	Sandy clay loam, loam.	SM-SC, SC, CL-ML, CL	A-4, A-6	0	100	95-100	60-80	40-60	25-35	5-15
	18-60	Silty clay loam, silt loam.	CL-ML, CL	A-4, A-6	0	100	95-100	90-95	75-85	20-35	5-15
ROG*. Rock outcrop											
RPG*: Rock outcrop.											
Deama	0-14	Cobbly loam	GM, ML	A-4	30-50	60-80	55-75	50-75	40-60	25-40	NP-10
	14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
RRF*: Rock outcrop.											
Lozier	0-7	Very gravelly loam.	GC, GM-GC	A-2, A-4, A-6	10-35	30-60	25-55	20-50	15-45	25-35	7-15
	7-15	Extremely gravelly silty clay loam.	GC	A-2	5-25	25-50	20-45	20-40	10-20	30-40	15-25
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
RTE*: Rock outcrop.											
Tortugas	0-10	Very cobbly loam	SM, SC, SM-SC	A-2	45-80	40-60	30-40	30-35	20-30	20-30	NP-10
	10	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Ustifluvents.											
RUA*:											
Ruidoso	0-32	Silt loam	CL-ML, CL	A-4, A-6	0	100	100	90-100	70-90	25-35	5-15
	32-60	Clay loam, clay	CH, CL	A-6, A-7	0	100	100	90-100	70-95	35-65	15-35
SGA*:											
Shanta	0-13	Loam	ML, CL-ML	A-4	0	100	100	85-100	60-90	25-35	5-10
	13-27	Clay loam, silty clay loam, silt loam.	CL	A-6	0	100	100	90-100	70-85	30-40	15-25
	27-60	Sandy loam	SM	A-2, A-4	0	100	100	60-75	30-45	15-25	NP-5
Gabaldon	0-9	Fine sandy loam	SM, ML	A-4	0	95-100	95-100	80-90	45-60	20-30	NP-5
	9-60	Loam, silt loam, silty clay loam.	ML, CL	A-4, A-6	0	95-100	95-100	90-100	80-90	30-40	5-20
TAC: Tencee	0-15	Very gravelly silt loam.	GM, GP-GM	A-1	0-25	35-50	25-45	15-40	5-20	20-30	NP-5
	15-28	Indurated	---	---	---	---	---	---	---	---	---
	28-60	Cobbly silt loam	GM, GP-GM	A-2	25-50	25-55	20-50	15-35	5-15	20-30	5-10

See footnote at end of table.

TABLE 19.--ENGINEERING PROPERTIES AND CLASSIFICATIONS OF SOILS IN LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
TDB----------------- Tome	0-5	Silt loam--------	ML	A-4	0	100	100	90-100	50-80	20-30	NP-5
	5-60	Stratified very fine sandy loam to clay loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	75-85	25-35	5-15
TOE----------------- Tortugas	0-10	Very cobbly loam	SM, SC, SM-SC	A-1, A-2	45-80	40-60	30-40	30-35	20-30	20-30	NP-10
	10	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
TPE*, TPG*:											
Tortugas-----------	0-10	Very gravelly loam.	GM, GP-GM	A-1	40-80	25-40	20-35	15-25	10-20	20-25	NP-4
	10	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Deama--------------	0-15	Very gravelly loam.	GM	A-2, A-4	5-15	50-70	40-60	35-55	25-45	25-40	NP-10
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

* See map unit description for the composition and behavior of the map unit.
** Desert pavement present.

TABLE 20.--ENGINEERING PROPERTIES AND CLASSIFICATIONS OF SOILS IN HIGH DETAIL MAP UNITS

[The symbol < means less than; > means greater than. Absence of an entry means data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
AbB----------------- Alamogordo	0-6	Very fine sandy loam.	ML, SM, GM	A-4, A-2	0	50-100	45-90	35-85	25-60	20-30	NP-5
	6-16	Loam, very fine sandy loam, fine sandy loam.	ML	A-4	0	95-100	90-100	70-95	50-75	20-30	NP-5
	16-60	Loam, very fine sandy loam, fine sandy loam.	SM, ML	A-4	0	95-100	90-100	70-100	45-75	25-35	NP-10
AcA----------------- Alamogordo	0-13	Silt loam--------	CL-ML, CL	A-4	0	95-100	90-100	85-100	65-90	20-30	5-10
	13-25	Loam, very fine sandy loam, fine sandy loam.	ML	A-4	0	95-100	90-100	70-95	50-75	20-30	NP-5
	25-60	Loam, very fine sandy loam, fine sandy loam.	SM, ML	A-4	0	95-100	90-100	70-100	45-75	25-35	NP-10
AdB*:											
Alamogordo---------	0-7	Very fine sandy loam.	ML, SM, GM	A-4, A-2	0	50-100	45-90	35-85	25-60	20-30	NP-5
	7-15	Loam, very fine sandy loam, fine sandy loam.	ML	A-4	0	95-100	90-100	70-95	50-75	20-30	NP-5
	15-60	Loam, very fine sandy loam, fine sandy loam.	SM, ML	A-4	0	95-100	90-100	70-100	45-75	25-35	NP-10
Aztec--------------	0-5	Fine sandy loam	GM	A-2	0-5	25-40	20-35	20-35	15-30	---	NP
	5-16	Gravelly sandy loam, gravelly fine sandy loam.	GM, SM	A-1, A-2	0-5	50-70	45-65	30-50	15-30	---	NP
	16-26	Very gravelly fine sandy loam, gravelly sandy loam, very gravelly fine sandy loam.	GM	A-1, A-2	0-5	45-60	40-55	25-45	15-30	---	NP
	26-60	Very gravelly very sandy loam, very gravelly loamy sand.	GP-GM, GM	A-1	0-5	25-55	20-50	10-35	5-20	---	NP
AhB*:											
Alamogordo---------	0-6	Sandy loam-------	SM, GM	A-2	0	50-100	45-90	35-60	15-30	---	NP
	6-15	Loam, very fine sandy loam, fine sandy loam.	ML	A-4	0	95-100	85-100	70-95	50-75	20-30	NP-5
	15-60	Gravelly loam, gravelly very fine sandy loam, gravelly fine sandy loam.	SM, ML	A-4	0	60-80	55-75	50-70	35-50	25-35	NP-10

See footnote at end of table.

TABLE 20.--ENGINEERING PROPERTIES AND CLASSIFICATIONS OF SOILS IN HIGH DETAIL MAP UNITS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
AhB*:											
McCullough--------	0-6	Sandy loam------	SM, ML	A-2, A-4	0	100	95-100	60-90	30-55	20-30	NP-5
	6-22	Fine sandy loam, loam, sandy loam.	SM, ML	A-4	0	100	90-100	70-90	35-65	20-30	NP-5
	22-60	Fine sandy loam, loam, sandy loam.	SM, ML	A-2, A-4	0	90-100	85-95	55-90	25-55	20-30	NP-5
AkA---------------- Alamogordo Variant	0-6	Very fine sandy loam.	ML, CL-ML	A-4	0	100	100	75-95	60-75	15-25	NP-5
	6-15	Loam, very fine sandy loam.	ML, CL-ML	A-4	0	100	100	75-95	60-75	15-25	NP-5
	15-27	Loam, very fine sandy loam.	ML, CL-ML	A-4	0	100	100	80-95	55-75	15-25	NP-5
	27-60	Very fine sandy loam, loam.	ML, CL-ML	A-4	0	100	100	80-95	55-75	15-25	NP-5
AnD---------------- Aztec	0-6	Gravelly fine sandy loam.	SM	A-1, A-2, A-4	0-5	60-90	55-85	40-65	20-50	---	NP
	6-26	Gravelly sandy loam, gravelly fine sandy loam.	GM, SM	A-1, A-2	0-5	45-70	40-65	25-50	15-30	---	NP
	26-60	Very gravelly sandy loam, very gravelly loamy sand.	GP-GM, GM	A-1	0-5	25-55	20-50	10-35	5-20	---	NP
AoB*:											
Aztec-------------	0-5	Gravelly fine sandy loam.	SM	A-1, A-2, A-4	0-5	45-90	40-85	35-65	20-50	---	NP
	5-17	Gravelly loam, gravelly fine sandy loam.	GM, SM	A-1, A-2, A-4	0-5	50-70	45650	35-60	20-40	---	NP
	17-60	Very gravelly sandy loam, gravelly sandy loam, very gravelly fine sandy loam.	GM	A-1, A-2	0-5	25-55	20-50	10-35	5-20	---	NP
Alamogordo--------	0-7	Fine sandy loam	ML, SM	A-4	0	50-100	45-90	35-85	25-60	20-30	NP-5
	7-17	Loam, very fine sandy loam, fine sandy loam.	ML	A-4	0	95-100	90-100	70-95	50-75	20-30	NP-5
	17-60	Loam, very fine sandy loam, fine sandy loam.	SM, ML	A-4	0	80-100	75-100	65-100	45-75	25-35	NP-10
Gu*. Gullied land											
GyC*, GyE*. Gypsum land											
HbA---------------- Holloman	0-13	Very fine sandy loam.	CL-ML, CL, ML	A-4, A-6	0	100	100	85-95	55-75	20-35	NP-15
	13	Weathered bedrock.	---	---	---	---	---	---	---	---	---
HcA*:											
Holloman----------	0-6	Very fine sandy loam.	CL-ML, CL, ML	A-4, A-6	0	100	100	85-95	55-75	20-35	NP-15
	6	Weathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 20.--ENGINEERING PROPERTIES AND CLASSIFICATIONS OF SOILS IN HIGH DETAIL MAP UNITS--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
HcA*: Gypsum land.											
LbB---------------- Largo	0-10	Sandy loam------	SM	A-2, A-4	0	100	100	60-75	30-50	---	NP
	10-27	Silt loam, very fine sandy loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	80-95	25-35	5-15
	27-60	Loam, silt loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	75-95	25-35	5-15
LcA---------------- Largo	0-5	Very fine sandy loam.	CL-ML, CL	A-4	0	100	100	90-100	50-70	20-35	5-10
	5-13	Loam, fine sandy loam.	ML, SM	A-4	0	100	100	80-90	45-70	20-30	NP-5
	13-60	Silt loam, silty clay loam.	CL	A-6	0	100	100	95-100	85-95	30-40	10-15
LdA---------------- Largo	0-4	Silt loam-------	CL-ML, CL	A-4	0	100	100	95-100	70-90	20-30	5-10
	4-21	Silt loam, very fine sandy loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	80-95	25-35	5-15
	21-60	Loam, silt loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	75-95	25-35	5-15
LdB---------------- Largo	0-5	Silt loam-------	CL-ML, CL	A-4	0	100	100	95-100	70-90	20-30	5-10
	5-25	Silt loam, very fine sandy loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	80-95	25-35	5-15
	25-60	Loam, silt loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	75-95	25-35	5-15
LdB2--------------- Largo	0-1	Silt loam-------	CL-ML, CL	A-4	0	100	100	90-100	70-90	20-30	5-10
	1-21	Silt loam, very fine sandy loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	100	100	90-100	80-95	25-35	5-15
	21-60	Loam, silt loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	75-95	25-35	5-15
LeA---------------- Largo	0-12	Silt loam-------	CL-ML, CL	A-4	0	100	100	95-100	75-90	20-30	5-10
	12-22	Silt loam, very fine sandy loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	80-95	25-35	5-15
	22-60	Loam, silt loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	75-95	25-35	5-15
LfB*: Largo-------------	0-6	Very fine sandy loam.	CL-ML, CL	A-4	0	100	100	95-100	50-70	20-30	5-10
	6-25	Silt loam, very fine sandy loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	80-95	25-35	5-15
	25-60	Loam, silt loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	75-95	25-35	5-15

See footnote at end of table.

TABLE 20.--ENGINEERING PROPERTIES AND CLASSIFICATIONS OF SOILS IN HIGH DETAIL MAP UNITS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
LfB*:											
Ogral**	0-6	Very fine sandy loam.	SM, ML	A-4	0	70-100	65-100	50-95	40-65	20-30	NP-5
	6-18	Fine sandy loam, sandy loam.	SM, ML	A-2, A-4	0	90-100	85-100	55-80	25-55	20-30	NP-5
	18-60	Very gravelly fine sandy loam, very gravelly sandy loam.	GP-GM, GM	A-1	0	25-50	20-45	15-40	5-25	20-30	NP-5
McB** McCullough	0-5	Sandy loam	SM, ML	A-2, A-4	0	70-100	65-100	50-90	30-55	20-30	NP-5
	5-22	Fine sandy loam, loam, very fine sandy loam.	SM, ML	A-4	0	100	90-100	70-90	35-65	20-30	NP-5
	22-29	Very gravelly coarse sand, very gravelly sandy loam, gravelly sandy loam.	GP-GM, GM, SP-SM, SM	A-1	0	40-75	35-70	25-55	5-25	---	NP
	29-60	Fine sandy loam, loam, sandy loam.	SM, ML	A-2, A-4	0	90-100	85-95	55-90	25-55	20-30	NP-5
MdA McCullough Variant	0-7	Very fine sandy loam.	ML	A-4	0	100	100	80-100	50-75	15-25	NP-5
	7-32	Loam, very fine sandy loam.	ML, CL-ML	A-4	0	100	100	80-100	60-85	20-35	NP-15
	32-60	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-90	25-35	NP-15
NaC*:											
Nickel	0-4	Gravelly sandy loam.	GM, SM	A-1, A-2, A-4	0-5	55-80	50-75	30-70	10-40	---	NP
	4-18	Very gravelly sandy loam, very gravelly fine sandy loam, gravelly sandy loam.	GP-GM, GM, SP-SM, SM	A-1	0-10	20-60	15-55	15-35	5-15	---	NP
	18-60	Very gravelly sandy loam, very gravelly fine sandy loam, gravelly sandy loam.	GP-GM, GM, SP-SM, SM	A-1	0-10	20-60	15-55	15-35	5-15	---	NP
Aztec**	0-6	Gravelly sandy loam.	SM	A-1, A-2, A-4	0-5	65-90	60-85	40-60	20-50	---	NP
	6-26	Gravelly sandy loam, gravelly fine sandy loam.	GM, SM	A-1, A-2	0-5	45-70	40-65	25-50	15-30	---	NP
	26-60	Very gravelly sandy loam, very gravelly loamy sand.	GP-GM, GM	A-1	0-5	25-55	20-50	10-35	5-20	---	NP
PkA Prelo	0-10	Sandy loam	SM, SM-SC, ML, CL-ML	A-4	0	100	100	60-95	40-65	15-25	NP-5
	10-38	Silty clay loam, silt loam, clay loam.	CL	A-6, A-7	0	100	100	95-100	75-95	30-45	10-20
	38-60	Silty clay loam, clay loam.	CL	A-6	0	100	100	95-100	75-95	30-40	10-20

See footnote at end of table.

TABLE 20.--ENGINEERING PROPERTIES AND CLASSIFICATIONS OF SOILS IN HIGH DETAIL MAP UNITS--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
PlA----------------- Prelo	0-4	Fine sandy loam	SM, SM-SC, ML, CL-ML	A-4	0	100	100	60-95	40-65	15-25	NP-5
	4-26	Silty clay loam, silt loam, clay loam.	CL	A-6, A-7	0	100	100	95-100	75-95	30-45	10-20
	26-60	Silty clay loam, clay loam, silt loam.	CL	A-6	0	100	100	95-100	75-95	30-40	10-20
PmA----------------- Prelo	0-8	Silt loam-------	CL-ML, CL	A-4, A-6	0	100	100	90-100	70-95	20-30	5-15
	8-22	Silty clay loam, silt loam, clay loam.	CL	A-6, A-7	0	100	100	95-100	75-95	30-45	10-20
	22-60	Silty clay loam, clay loam, silt loam.	CL	A-6	0	100	100	95-100	75-95	30-40	10-20
PmB----------------- Prelo	0-6	Silt loam-------	CL-ML, CL	A-4, A-6	0	100	100	90-100	70-95	20-30	5-15
	6-20	Silty clay loam, silt loam, clay loam.	CL	A-6, A-7	0	100	100	95-100	75-95	30-45	10-20
	20-60	Silty clay loam, clay loam, silt loam.	CL	A-6	0	100	100	95-100	75-95	30-40	10-20
PmB2---------------- Prelo	0-2	Silt loam-------	CL-ML, CL	A-4, A-6	0	100	100	90-100	70-95	20-30	5-15
	2-8	Silty clay loam, silt loam, clay loam.	CL	A-6, A-7	0	100	100	95-100	75-95	30-45	10-20
	8-60	Silty clay loam, clay loam.	CL	A-6	0	100	100	95-100	75-95	30-40	10-20
PnA----------------- Prelo	0-4	Silt loam-------	CL-ML, CL	A-4, A-6	0	100	100	90-100	70-95	20-30	5-15
	4-28	Silty clay loam, silt loam, clay loam.	CL	A-6, A-7	0	100	100	95-100	75-95	30-45	10-20
	28-60	Silty clay loam, clay loam.	CL	A-6	0	100	100	95-100	75-95	30-40	10-20
PpA----------------- Prelo	0-12	Silt loam-------	CL-ML, CL	A-4, A-6	0	100	100	90-100	70-95	20-30	5-15
	12-32	Silty clay loam, silt loam, clay loam.	CL	A-6, A-7	0	100	100	95-100	75-95	30-45	10-20
	32-60	Silty clay loam, clay loam.	CL	A-6	0	100	100	95-100	75-95	30-40	10-20
PvB*:											
Prelo--------------	0-9	Silt loam-------	CL-ML, CL	A-4, A-6	0	100	100	90-100	70-95	20-30	5-15
	9-24	Silty clay loam, silt loam, clay loam.	CL	A-6, A-7	0	100	100	95-100	75-95	30-45	10-20
	24-60	Silty clay loam, clay loam.	CL	A-6	0	100	100	95-100	75-95	30-40	10-20
Prelo Variant------	0-7	Silt loam-------	CL	A-6	0	100	100	95-100	75-90	20-30	10-15
	7-22	Silt loam, silty clay loam, clay loam.	CL	A-6, A-7	0	100	100	95-100	75-95	30-45	10-20
	22-30	Silty clay loam, clay loam.	CL	A-6	0	95-100	90-100	85-100	65-85	30-40	10-15
	30-60	Very gravelly sandy loam.	GP-GM, GW-GM	A-1	0	30-45	20-40	15-35	5-10	---	NP
RbA----------------- Reeves	0-8	Very fine sandy loam.	CL-ML, ML	A-4	0	100	100	90-100	60-75	20-35	NP-10
	8-32	Clay loam, silt loam.	CL-ML, CL	A-4, A-6	0	100	100	85-100	60-80	20-30	5-15
	32-60	Fine sandy loam, silt loam.	ML	A-4	0	100	95-100	80-95	55-75	20-30	NP-5

See footnote at end of table.

TABLE 20.--ENGINEERING PROPERTIES AND CLASSIFICATIONS OF SOILS IN HIGH DETAIL MAP UNITS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
RcB2: Reeves	0-2	Very fine sandy loam.	CL-ML, ML	A-4	0	100	100	90-100	60-75	20-35	NP-10
	2-27	Clay loam, silt loam.	CL-ML, CL	A-4, A-6	0	100	100	85-100	60-80	20-30	5-15
	27-60	Loam, silt loam	ML	A-4	0	100	95-100	80-95	55-75	20-30	NP-5
RdA: Reeves	0-10	Very fine sandy loam.	ML, CL-ML	A-4	0	100	100	85-100	55-80	15-25	NP-5
	10-35	Silt loam, clay loam, loam.	CL-ML, CL	A-4, A-6	0	100	100	85-100	60-75	25-35	5-15
	35-60	Silt loam, loam, clay loam.	CL-ML, CL	A-4, A-6	0	100	100	85-100	60-75	25-35	5-15
TbA: Tobler	0-2	Silt loam	CL-ML	A-4	0	95-100	95-100	90-100	75-85	20-30	5-10
	2-50	Stratified silt loam to loamy fine sand.	SM	A-4	0	95-100	90-100	65-75	35-45	15-25	NP-5
	50-60	Silty clay loam	CL	A-6, A-7	0	100	95-100	90-100	75-90	30-45	10-20
TcA: Tome	0-6	Very fine sandy loam.	ML	A-4	0	100	100	90-100	50-80	20-30	NP-5
	6-60	Stratified very fine sandy loam to silt loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	75-85	25-35	5-15
TcB: Tome	0-3	Very fine sandy loam.	ML	A-4	0	100	100	90-100	50-80	20-30	NP-5
	3-60	Stratified very fine sandy loam to silty clay loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	75-85	25-35	5-15
TeB: Tome	0-6	Silt loam	ML	A-4	0	100	100	90-100	50-80	20-30	NP-5
	6-60	Stratified very fine sandy loam and silt loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	75-85	25-35	5-15
TfB*:											
Tome	0-5	Loam	ML	A-4	0	100	100	90-100	50-80	20-30	NP-5
	5-60	Stratified very fine sandy loam and silt loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	75-85	25-35	5-15
Emot	0-4	Gravelly fine sandy loam.	SM	A-2, A-4	0	70-80	65-75	50-65	30-45	20-30	NP-5
	4-11	Gravelly very fine sandy loam, very fine sandy loam.	SM, GM	A-2, A-4	0	55-85	50-80	45-75	30-50	20-30	NP-5
	11-60	Extremely gravelly silt loam.	GM-GC, GM	A-1, A-2	5-15	25-45	20-40	20-40	15-35	25-35	5-10
TvA*. Torrifluvents											
UaA*. Ustic Torriorthents											

* See map unit description for the composition and behavior of the map unit.
** Desert pavement present.

TABLE 21.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS IN LOW DETAIL MAP UNITS

[The symbol < means less than; > means greater than. The erosion tolerance factor (T) is for the entire profile. Wind erodibility group is for the surface layer. Absence of an entry means data were not available or were not estimated]

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group
	In	In/hr	In/in	pH	Mmhos/cm				
AEC*:									
Alamogordo------	0-7	2.0-6.0	0.06-0.14	7.9-8.4	4-16	Low--------	0.43	1	3
	7-15	2.0-6.0	0.04-0.09	7.9-8.4	>4	Low--------	0.55		
	15-60	2.0-6.0	0.06-0.10	7.9-8.4	>4	Low--------	0.49		
Gypsum land.									
AGE*:									
Alamogordo------	0-6	2.0-6.0	0.06-0.14	7.9-8.4	4-16	Low--------	0.43	1	3
	6-26	2.0-6.0	0.04-0.09	7.9-8.4	>4	Low--------	0.55		
	26-60	2.0-6.0	0.06-0.10	7.9-8.4	>4	Low--------	0.49		
Gypsum land.									
Aztec-----------	0-5	2.0-6.0	0.10-0.14	7.9-8.4	<2	Low--------	0.24	5	3
	5-16	0.2-0.6	0.07-0.11	7.9-8.4	<2	Low--------	0.17		
	16-31	2.0-6.0	0.06-0.10	7.9-8.4	2-4	Low--------	0.17		
	31-60	2.0-6.0	0.03-0.07	7.4-8.4	4-8	Low--------	0.15		
AMC-------------- Armesa	0-3	0.6-2.0	0.15-0.17	7.9-8.4	<2	Low--------	0.32	5	3
	3-14	0.6-2.0	0.15-0.21	7.9-8.4	<2	Moderate	0.37		
	14-31	0.6-2.0	0.16-0.21	7.9-8.4	<2	Moderate	0.37		
	31-60	0.6-2.0	0.11-0.16	7.9-8.4	<2	Low--------	0.28		
AZF*:									
Aztec-----------	0-4	0.6-2.0	0.08-0.15	7.9-8.4	<2	Low--------	0.20	5	7
	4-16	0.2-0.6	0.07-0.11	7.9-8.4	<2	Low--------	0.17		
	16-26	2.0-6.0	0.06-0.10	7.9-8.4	2-4	Low--------	0.17		
	26-60	2.0-6.0	0.03-0.07	7.4-8.4	4-8	Low--------	0.15		
Rock outcrop.									
Lozier----------	0-7	0.6-2.0	0.05-0.10	7.9-8.4	<2	Very low	0.10	1	---
	7-15	0.6-2.0	0.07-0.10	7.9-8.4	<2	Very low	0.10		
	15-20	---	---	---	---	-----------	---		
BAF*. Badland									
BOA*:									
Bluepoint-------	0-8	6.0-20	0.06-0.10	7.4-8.4	<8	Low--------	0.15	5	2
	8-60	6.0-20	0.06-0.10	7.4-8.4	<8	Low--------	0.15		
Onite-----------	0-10	6.0-20	0.06-0.10	7.4-7.8	<2	Low--------	0.17	5	2
	10-30	2.0-6.0	0.07-0.12	7.4-8.4	<2	Low--------	0.24		
	30-60	2.0-6.0	0.06-0.12	7.9-8.4	<2	Low--------	0.24		
Wink------------	0-2	2.0-6.0	0.08-0.14	7.9-8.4	<2	Low--------	0.20	3	3
	2-18	2.0-6.0	0.10-0.15	7.9-8.4	<2	Low--------	0.20		
	18-60	2.0-6.0	0.00-0.06	7.9-8.4	<2	Very low	0.20		
BRF-------------- Borrego	0-5	0.6-2.0	0.11-0.13	6.6-7.3	<2	Low--------	0.24	1	---
	5-16	<0.06	0.10-0.12	5.6-7.3	<2	High-------	0.32		
	16	---	---	---	---	-----------	---		
CFA-------------- Crowflats	0-4	0.6-2.0	0.13-0.19	7.9-8.4	<2	Low--------	0.49	5	4L
	4-60	0.6-2.0	0.15-0.19	7.4-8.4	<2	Low--------	0.49		
DEB, DEF--------- Deama	0-15	0.6-2.0	0.10-0.12	7.9-8.4	<2	Low--------	0.28	1	8
	15	---	---	---	---	-----------	---		

See footnote at end of table.

TABLE 21.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS IN LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group
	In	In/hr	In/in	pH	Mmhos/cm				
DRF*:									
Deama-----------	0-14	0.6-2.0	0.10-0.12	7.9-8.4	<2	Low-------	0.28	1	8
	14	---	---	---	---	----------	---		
Rock outcrop.									
DRG*:									
Deama-----------	0-14	0.6-2.0	0.10-0.12	7.4-8.4	<2	Low-------	0.28	1	8
	14	---	---	---	---	----------	---		
Rock outcrop.									
DSF*:									
Deama-----------	0-14	0.6-2.0	0.10-0.12	7.9-8.4	<2	Low-------	0.28	1	8
	14	---	---	---	---	----------	---		
Rock outcrop.									
Holloman Variant	0-12	0.6-2.0	0.12-0.14	7.9-8.4	<2	Low-------	0.37	1	---
	12	---	---	---	---	----------	---		
DTB*:									
Dona Ana---------	0-3	2.0-6.0	0.10-0.13	7.4-8.4	<2	Low-------	0.24	2	3
	3-37	0.6-2.0	0.13-0.17	7.9-8.4	2-4	Moderate	0.32		
	37-60	0.6-2.0	0.13-0.17	7.9-8.4	2-4	Moderate	0.43		
Berino----------	0-3	2.0-6.0	0.10-0.13	7.4-8.4	<2	Low-------	0.24	3	3
	3-60	0.6-2.0	0.13-0.17	7.4-8.4	2-4	Moderate	0.32		
DYE*:									
Dye-------------	0-1	0.2-0.6	0.19-0.21	6.6-8.4	<2	Moderate	0.32	1	4
	1-17	0.06-0.2	0.14-0.16	6.6-8.4	<2	High------	0.28		
	17	---	---	---	---	----------	---		
Encierro---------	0-2	0.6-2.0	0.15-0.20	7.4-7.8	<2	Moderate	0.32	1	6
	2-13	0.06-0.2	0.14-0.16	6.1-8.4	<2	High------	0.32		
	13	---	---	---	---	----------	---		
ECF*:									
Ector-----------	0-17	0.6-2.0	0.10-0.14	7.9-8.4	<2	Very low	0.10	1	---
	17	---	---	---	---	----------	---		
Rock outcrop.									
ESB*:									
Espy------------	0-17	0.6-2.0	0.10-0.16	7.4-8.4	<2	Moderate	0.10	1	---
	17-22	---	---	---	---	----------	---		
	22-60	0.2-0.6	0.02-0.04	7.9-8.4	<2	Low------	0.10		
Shanta Variant--	0-12	0.6-2.0	0.16-0.21	7.4-7.8	<2	Low-------	0.37	5	4L
	12-60	0.2-0.6	0.19-0.21	7.9-8.4	<2	Moderate	0.49		
GZB*:									
Gypsum land.									
Holloman--------	0-8	0.6-2.0	0.12-0.14	7.4-8.4	4-16	Low-------	0.49	1	4L
	8	---	---	---	---	----------	---		
HOB*:									
Holloman--------	0-16	0.6-2.0	0.12-0.14	7.4-8.4	4-16	Low-------	0.49	1	4L
	16	---	---	---	---	----------	---		
Gypsum land.									
Yesum-----------	0-3	0.6-2.0	0.13-0.15	7.4-8.4	4-16	Low-------	0.43	5	4L
	3-65	0.6-2.0	0.08-0.12	7.4-8.4	8-16	Low-------	0.43		

See footnote at end of table.

TABLE 21.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS IN LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group
	In	In/hr	In/in	pH	Mmhos/cm				
HPB*:									
Holloman--------	0-12	0.6-2.0	0.12-0.14	7.4-8.4	4-16	Low--------	0.49	1	4L
	12	---	---	---	---	----------	---		
Reeves----------	0-4	0.6-2.0	0.16-0.18	7.9-8.4	2-8	Low--------	0.49	2	4L
	4-24	0.6-2.0	0.19-0.21	7.9-8.4	2-8	Moderate	0.37		
	24-35	0.6-2.0	0.05-0.08	7.9-8.4	4-8	Low--------	0.49		
	35-60	0.6-2.0	0.06-0.10	7.9-8.4	4-8	Moderate	0.37		
JAB*:									
Jal-------------	0-12	0.6-2.0	0.16-0.18	7.9-8.4	<2	Low--------	0.43	2	4L
	12-60	0.6-2.0	0.10-0.14	7.9-9.0	2-4	Low--------	0.37		
Tome------------	0-6	0.2-2.0	0.18-0.20	7.9-8.4	<2	Low--------	0.43	5	4L
	6-60	0.2-0.6	0.16-0.18	7.9-8.4	<2	Moderate	0.43		
JEC*:									
Jerag-----------	0-3	0.6-2.0	0.13-0.17	7.4-7.8	<2	Low--------	0.37	1	3
	3-9	0.6-2.0	0.13-0.19	7.4-7.8	<2	Moderate	0.28		
	9-19	0.6-2.0	0.07-0.13	7.9-8.4	<2	Low--------	0.24		
	19-25	---	---	---	---	----------	---		
	25-60	0.6-2.0	---	7.9-8.4	<2	Low--------	0.24		
Philder---------	0-4	0.6-2.0	0.15-0.17	7.4-7.8	<2	Low--------	0.32	1	3
	4-12	0.6-2.0	0.12-0.14	7.9-8.4	<2	Low--------	0.28		
	12-18	0.6-2.0	0.04-0.06	7.9-8.4	<2	Low--------	0.17		
	18-29	---	---	---	---	----------	---		
	29-60	0.6-2.0	---	7.9-8.4	<2	Low--------	0.17		
Armesa----------	0-3	0.6-2.0	0.15-0.17	7.9-8.4	<2	Low--------	0.32	5	3
	3-18	0.6-2.0	0.15-0.21	7.9-8.4	<2	Moderate	0.37		
	18-60	0.6-2.0	0.16-0.21	7.9-8.4	<2	Moderate	0.37		
LAB*------------- La Fonda	0-2	0.6-2.0	0.15-0.19	7.4-7.8	<2	Low--------	0.43	5	4L
	2-60	0.6-2.0	0.15-0.20	7.9-8.4	<2	Moderate	0.37		
LDB-------------- Largo	0-4	0.6-2.0	0.16-0.21	7.4-8.4	<4	Low--------	0.49	5	4L
	4-21	0.2-0.6	0.16-0.21	7.4-8.4	<4	Moderate	0.49		
	21-60	0.2-0.6	0.16-0.21	7.4-8.4	<4	Moderate	0.49		
LGB*:									
Largo-----------	0-6	0.6-2.0	0.16-0.21	7.9-8.4	<4	Low--------	0.49	5	4L
	6-24	0.2-0.6	0.16-0.21	7.9-8.4	<4	Moderate	0.49		
	24-60	0.2-0.6	0.16-0.21	7.9-8.4	<4	Moderate	0.49		
Ogral-----------	0-6	0.6-6.0	0.13-0.17	7.9-8.4	<2	Low--------	0.43	1	3
	6-18	2.0-6.0	0.08-0.15	7.9-8.4	<2	Low--------	0.43		
	18-60	2.0-6.0	0.04-0.08	7.9-8.4	<2	Low--------	0.15		
LOB*:									
Lozier----------	0-15	0.6-2.0	0.05-0.10	7.9-8.4	<2	Very low	0.10	1	---
	15	---	---	---	---	----------	---		
Rock outcrop.									
LOD*:									
Lozier----------	0-15	0.6-2.0	0.05-0.10	7.9-8.4	<2	Very low	0.10	1	---
	15	---	---	---	---	----------	---		
Rock outcrop.									
MEA-------------- Mead	0-5	0.06-0.2	0.15-0.17	>7.9	>16	Moderate	---	---	---
	5-60	<0.06	0.14-0.16	>7.9	>16	High------	---		

See footnote at end of table.

TABLE 21.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS IN LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group
	In	In/hr	In/in	pH	Mmhos/cm				
MJA*:									
Mimbres----------	0-12	0.6-2.0	0.13-0.19	7.9-8.4	<4	Moderate	0.43	5	6
	12-36	0.2-0.6	0.16-0.21	7.9-8.4	<4	Moderate	0.43		
	36-60	0.2-0.6	0.13-0.16	7.9-8.4	<4	Moderate	0.28		
Jal--------------	0-4	0.6-2.0	0.16-0.18	7.9-8.4	<2	Low--------	0.43	2	4L
	4-60	0.6-2.0	0.10-0.14	8.5-9.0	2-4	Low--------	0.37		
MPA*:									
Mimbres----------	0-6	0.6-2.0	0.12-0.15	7.9-8.4	<4	Low--------	0.37	5	3
	6-29	0.2-0.6	0.16-0.21	7.9-8.4	<4	Moderate	0.43		
	29-60	0.2-0.6	0.13-0.16	7.9-8.4	<4	Moderate	0.28		
Prelo------------	0-8	0.6-2.0	0.19-0.21	7.9-8.4	<2	Low--------	0.43	5	4L
	8-32	0.2-0.6	0.19-0.21	7.9-8.4	2-4	Moderate	0.43		
	32-50	0.2-0.6	0.11-0.13	7.9-8.4	4-8	Moderate	0.43		
MTA*:									
Mimbres----------	0-6	0.6-2.0	0.13-0.19	7.4-8.4	<4	Moderate	0.43	5	6
	6-25	0.2-0.6	0.16-0.21	7.9-8.4	<4	Moderate	0.43		
	25-60	0.2-0.6	0.13-0.16	7.9-8.4	<4	Moderate	0.28		
Tome-------------	0-5	0.6-2.0	0.18-0.20	7.9-8.4	<2	Low--------	0.43	5	4L
	5-60	0.2-0.6	0.16-0.18	7.9-8.4	<2	Moderate	0.43		
MXC-------------- Montecito	0-3	0.6-2.0	0.13-0.18	7.4-8.4	<2	Low--------	0.32	5	6
	3-62	0.2-0.6	0.14-0.20	7.4-8.4	<2	High-------	0.28		
NTD*:									
Nickel-----------	0-5	0.6-2.0	0.11-0.15	7.9-8.4	<2	Low--------	0.24	5	---
	5-17	0.2-0.6	0.04-0.07	7.9-8.4	<2	Low--------	0.17		
	17-60	0.2-0.6	0.04-0.07	7.9-8.4	<2	Low--------	0.15		
Tencee-----------	0-15	0.6-2.0	0.05-0.10	7.9-8.4	<2	Low--------	0.15	1	---
	15-25	---	---	---	---	-----------	---		
	25-60	0.6-2.0	---	7.9-8.4	<2	Low--------	0.10		
OPB*:									
Onite------------	0-10	6.0-20	0.06-0.10	7.4-7.8	<2	Low--------	0.17	5	2
	10-30	2.0-6.0	0.07-0.12	7.4-8.4	<2	Low--------	0.24		
	30-60	2.0-20	0.06-0.12	7.9-8.4	<2	Low--------	0.24		
Pintura----------	0-60	6.0-20	0.05-0.08	7.4-8.4	<2	Low--------	0.20	5	2
PAE*:									
Pena-------------	0-7	0.6-2.0	0.14-0.19	7.4-8.4	<2	Low--------	0.32	3	4L
	7-16	0.6-2.0	0.05-0.08	7.9-8.4	2-4	Low--------	0.28		
	16-60	0.6-2.0	0.03-0.08	7.9-8.4	2-4	Low--------	0.24		
Aztec Variant----	0-8	2.0-6.0	0.08-0.12	7.9-8.4	<2	Low--------	0.20	5	---
	8-31	0.6-2.0	0.05-0.08	7.9-8.4	2-4	Low--------	0.15		
	31-60	2.0-6.0	0.07-0.09	7.9-8.4	2-4	Low--------	0.15		
PCB*:									
Pena-------------	0-9	0.6-2.0	0.14-0.19	7.4-8.4	<2	Low--------	0.32	3	4L
	9-14	0.6-2.0	0.05-0.08	7.9-8.4	2-4	Low--------	0.28		
	14-60	0.6-2.0	0.03-0.08	7.9-8.4	2-4	Low--------	0.24		
Cale-------------	0-6	0.6-2.0	0.19-0.21	7.4-8.4	<2	Moderate	0.32	5	6
	6-33	0.2-0.6	0.19-0.21	7.4-8.4	<2	Moderate	0.37		
	33-60	0.2-0.6	0.17-0.19	7.9-8.4	<2	Moderate	0.37		
Kerrick----------	0-9	0.6-2.0	0.12-0.18	7.9-8.4	<2	Low--------	0.32	2	5
	9-25	0.6-2.0	0.10-0.17	7.9-8.4	<2	Low--------	0.32		
	25-40	---	---	---	---	-----------	---		

See footnote at end of table.

TABLE 21.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS IN LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group
	In	In/hr	In/in	pH	Mmhos/cm				
PDF*:									
Pena Variant----	0-12	0.6-2.0	0.16-0.21	7.9-8.4	<2	Moderate	0.37	3	4L
	12-25	0.6-2.0	0.11-0.13	7.9-8.4	<2	Moderate	0.23		
	25-60	2.0-6.0	0.03-0.07	7.9-8.4	<2	Low-------	0.17		
Rock outcrop.									
PEC--------------	0-4	0.6-2.0	0.15-0.17	7.4-7.8	<2	Low-------	0.32	1	3
Philder	4-12	0.6-2.0	0.12-0.14	7.9-8.4	<2	Low-------	0.28		
	12-18	0.6-2.0	0.04-0.06	7.9-8.4	<2	Low-------	0.17		
	18-29	---	---	---	---	----------	---		
	29-60	0.6-2.0	---	7.9-8.4	<2	Low-------	0.17		
PFB*:									
Philder---------	0-4	0.6-2.0	0.15-0.17	7.4-7.8	<2	Low-------	0.32	1	3
	4-12	0.6-2.0	0.12-0.14	7.9-8.4	<2	Low-------	0.28		
	12-18	0.6-2.0	0.04-0.06	7.9-8.4	<2	Low-------	0.17		
	18-29	---	---	---	---	----------	---		
	29-60	0.6-2.0	---	7.9-8.4	<2	Low-------	0.17		
Armesa----------	0-3	0.6-2.0	0.15-0.17	7.9-8.4	<2	Low-------	0.32	5	3
	3-18	0.6-2.0	0.15-0.21	7.9-8.4	<2	Moderate	0.37		
	18-60	0.6-2.0	0.16-0.21	7.9-8.4	<2	Moderate	0.37		
PGB*:									
Pintura---------	0-60	6.0-20	0.05-0.08	7.4-7.8	<2	Low-------	0.20	5	2
Dona Ana--------	0-3	2.0-6.0	0.10-0.13	7.9-8.4	<2	Low-------	0.24	2	3
	3-37	0.6-2.0	0.13-0.17	7.9-8.4	2-4	Moderate	0.32		
	37-60	0.6-2.0	0.13-0.17	7.9-8.4	2-4	Moderate	0.43		
PHB*:									
Pintura---------	0-60	6.0-20	0.05-0.08	7.4-8.4	<2	Low-------	0.20	5	2
Tome------------	0-5	0.2-2.0	0.18-0.20	7.9-8.4	<2	Low-------	0.43	5	4L
	5-60	0.2-0.6	0.16-0.18	7.9-8.4	<2	Moderate	0.43		
Dona Ana--------	0-3	2.0-6.0	0.10-0.13	7.9-8.4	<2	Low-------	0.24	2	3
	3-37	0.6-2.0	0.13-0.17	7.9-8.4	2-4	Moderate	0.32		
	37-60	0.6-2.0	0.13-0.17	7.9-8.4	2-4	Moderate	0.43		
POB--------------	0-8	0.6-2.0	0.19-0.21	7.9-8.4	<2	Low-------	0.43	5	4L
Prelo	8-32	0.2-0.6	0.19-0.21	7.9-8.4	2-4	Moderate	0.43		
	32-50	0.2-0.6	0.11-0.13	7.9-8.4	4-8	Moderate	0.43		
RAB*:									
Reakor----------	0-4	0.6-2.0	0.16-0.20	7.9-8.4	2-4	Low-------	0.49	5	4L
	4-60	0.6-2.0	0.16-0.21	7.9-8.4	2-4	Moderate	0.43		
Tome------------	0-6	0.6-2.0	0.18-0.20	7.9-8.4	<2	Low-------	0.43	5	4L
	6-60	0.2-0.6	0.16-0.18	7.9-8.4	<2	Moderate	0.43		
Tencee----------	0-15	0.6-2.0	0.05-0.10	7.9-8.4	<2	Low-------	0.15	1	---
	15-25	---	---	---	---	----------	---		
	25-60	0.6-2.0	---	7.9-8.4	<2	Low-------	0.10		
REB*:									
Reeves Variant--	0-7	0.6-2.0	0.06-0.15	7.9-8.4	4-16	Low-------	0.43	2	3
	7-12	0.6-2.0	0.07-0.16	7.9-8.4	4-16	Low-------	0.43		
	12-16	0.6-2.0	0.08-0.17	7.9-8.4	4-16	Low-------	0.55		
	16-29	0.6-2.0	0.05-0.09	7.9-8.4	>8	Low-------	0.49		
	29-60	0.6-2.0	0.08-0.16	7.9-8.4	4-16	Moderate	0.49		
Shanta----------	0-13	0.6-2.0	0.15-0.18	7.4-7.8	<2	Low-------	0.32	4	4L
	13-27	0.6-2.0	0.16-0.21	7.4-8.4	<2	Moderate	0.32		
	27-60	0.6-2.0	0.12-0.18	7.4-8.4	<2	Moderate	0.32		

See footnote at end of table.

TABLE 21.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS IN LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group
	In	In/hr	In/in	pH	Mmhos/cm				
RFA*:									
Reyab-----------	0-4	0.6-2.0	0.13-0.19	7.9-8.4	<2	Low-------	0.49	5	4L
	4-60	0.2-0.6	0.15-0.19	7.9-8.4	<2	Moderate	0.55		
Armesa----------	0-3	0.6-2.0	0.15-0.17	7.9-8.4	<2	Low-------	0.32	5	3
	3-18	0.6-2.0	0.15-0.21	7.9-8.4	<2	Moderate	0.37		
	18-60	0.6-2.0	0.16-0.21	7.9-8.4	<2	Moderate	0.37		
ROG*. Rock outcrop									
RPG*:									
Rock outcrop.									
Deama-----------	0-14	0.6-2.0	0.10-0.12	7.4-8.4	<2	Low-------	0.28	1	8
	14	---	---	---	---	----------	---		
RRF*:									
Rock outcrop.									
Lozier----------	0-15	0.6-2.0	0.05-0.10	7.9-8.4	<2	Very low	0.10	1	---
	15	---	---	---	---	----------	---		
RTE*:									
Rock outcrop.									
Tortugas--------	0-10	0.6-2.0	0.07-0.09	7.9-8.4	<2	Low-------	0.20	1	---
	10	---	---	---	---	----------	---		
Ustifluvents.									
RUA*:									
Ruidoso---------	0-32	0.2-0.6	0.15-0.21	7.4-7.8	<2	Moderate	0.28	5	6
	32-60	0.06-0.2	0.14-0.19	7.4-7.8	<2	Moderate	0.28		
SGA*:									
Shanta----------	0-13	0.6-2.0	0.19-0.21	7.4-7.8	<2	Low-------	0.32	5	4L
	13-27	0.6-2.0	0.19-0.21	7.4-8.4	<2	Moderate	0.32		
	27-60	0.6-6.0	0.12-0.14	7.9-8.4	<2	Low-------	0.24		
Gabaldon--------	0-16	0.6-2.0	0.12-0.15	7.4-7.8	<2	Low-------	0.24	5	3
	16-60	0.6-2.0	0.16-0.20	7.4-7.8	<2	Moderate	0.37		
TAC-------------- Tencee	0-15	0.6-2.0	0.05-0.10	7.9-8.4	<2	Low-------	0.15	1	---
	15-28	---	---	---	---	----------	---		
	28-60	0.6-2.0	---	7.9-8.4	---	----------	---		
TDB-------------- Tome	0-6	0.6-2.0	0.18-0.20	7.9-8.4	<2	Low-------	0.43	5	4L
	6-60	0.2-0.6	0.16-0.18	7.9-8.4	<2	Moderate	0.43		
TOE-------------- Tortugas	0-10	0.6-2.0	0.07-0.09	7.9-8.4	<2	Low-------	0.20	1	---
	10	---	---	---	---	----------	---		
TPE*, TPG*:									
Tortugas--------	0-10	0.6-2.0	0.07-0.09	7.9-8.4	<2	Low-------	0.20	1	---
	10	---	---	---	---	----------	---		
Deama-----------	0-15	0.6-2.0	0.10-0.12	7.9-8.4	<2	Low-------	0.28	1	8
	15	---	---	---	---	----------	---		

* See map unit description for the composition and behavior of the map unit.

TABLE 22.--PHYSICAL AND CHEMICAL PROPERTIES OF SOIL IN HIGH DETAIL MAP UNITS

[The symbol < means less than; > means greater than. The erosion tolerance factor (T) is for the entire profile. Wind erodibility group is for the surface layer. Absence of an entry means data were not available or were not estimated]

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group
	In	In/hr	In/in	pH	Mmhos/cm				
AbB-------------- Alamogordo	0-6	2.0-6.0	0.06-0.14	7.9-8.4	4-16	Low-------	0.43	1	3
	6-16	2.0-6.0	0.04-0.09	7.9-8.4	>4	Low-------	0.55		
	16-60	2.0-6.0	0.06-0.10	7.9-8.4	>4	Low-------	0.49		
AcA-------------- Alamogordo	0-13	2.0-2.0	0.09-0.16	7.9-8.4	4-16	Low-------	0.49	1	4L
	13-25	2.0-6.0	0.04-0.09	7.9-8.4	>4	Low-------	0.55		
	25-60	2.0-6.0	0.06-0.10	7.9-8.4	>4	Low-------	0.49		
AdB*:									
Alamogordo------	0-7	2.0-6.0	0.06-0.14	7.9-8.4	4-16	Low-------	0.43	1	3
	7-15	2.0-6.0	0.04-0.09	7.9-8.4	>4	Low-------	0.55		
	15-60	2.0-6.0	0.06-0.10	7.9-8.4	>4	Low-------	0.49		
Aztec-----------	0-5	2.0-6.0	0.10-0.14	7.9-8.4	<2	Low-------	0.24	5	3
	5-16	0.2-0.6	0.07-0.11	7.9-8.4	<2	Low-------	0.17		
	16-26	2.0-6.0	0.06-0.10	7.9-8.4	2-4	Low-------	0.17		
	26-60	6.0-20	0.03-0.07	7.4-8.4	4-8	Low-------	0.15		
AhB*:									
Alamogordo------	0-6	2.0-6.0	0.05-0.10	7.9-8.4	4-16	Low-------	0.37	1	3
	6-15	2.0-6.0	0.04-0.09	7.9-8.4	>4	Low-------	0.55		
	15-60	2.0-6.0	0.06-0.10	7.9-8.4	>4	Low-------	0.49		
McCullough------	0-6	2.0-6.0	0.11-0.15	7.9-8.4	<2	Low-------	0.24	5	3
	6-22	2.0-6.0	0.11-0.16	7.9-8.4	<2	Low-------	0.24		
	22-60	2.0-6.0	0.11-0.16	7.9-8.4	<2	Low-------	0.24		
AkA-------------- Alamogordo Variant	0-6	0.6-2.0	0.12-0.15	7.9-8.4	<4	Low-------	0.37	1	3
	6-15	0.6-2.0	0.09-0.12	7.9-8.4	4-8	Low-------	0.37		
	15-27	0.6-2.0	0.05-0.07	7.9-8.4	>8	Low-------	0.37		
	27-60	0.6-2.0	0.06-0.09	7.9-8.4	8-16	Low-------	0.37		
AnD-------------- Aztec	0-6	0.6-2.0	0.08-0.15	7.9-8.4	<2	Low-------	0.20	5	7
	6-26	0.2-0.6	0.07-0.11	7.9-8.4	<2	Low-------	0.17		
	26-60	6.0-20	0.03-0.07	7.4-8.4	4-8	Low-------	0.15		
AoB*:									
Aztec-----------	0-5	0.6-6.0	0.08-0.15	7.9-8.4	<2	Low-------	0.20	5	7
	5-17	0.2-0.6	0.07-0.11	7.9-8.4	<2	Low-------	0.17		
	17-60	2.0-6.0	0.06-0.10	7.9-8.4	2-4	Low-------	0.17		
Alamogordo------	0-7	0.6-2.0	0.06-0.14	7.9-8.4	4-16	Low-------	0.43	1	3
	7-17	0.6-2.0	0.04-0.09	7.9-8.4	>4	Low-------	0.55		
	17-60	0.6-2.0	0.06-0.10	7.9-8.4	>4	Low-------	0.49		
Gu*. Gullied land									
GyC*, GyE*. Gypsum land									
HbA-------------- Holloman	0-13	0.6-2.0	0.12-0.14	7.4-8.4	4-16	Low-------	0.49	1	4L
	13	---	---	---	---	----------	---		
HcA*:									
Holloman--------	0-6	0.6-2.0	0.12-0.14	7.4-8.4	4-16	Low-------	0.49	1	4L
	6	---	---	---	---	----------	---		
Gypsum land.									

See footnote at end of table.

TABLE 22.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS IN HIGH DETAIL MAP UNITS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group
	In	In/hr	In/in	pH	Mmhos/cm				
LbB: Largo	0-10	2.0-6.0	0.11-0.14	7.4-8.4	<4	Low	0.32	5	3
	10-27	0.2-0.6	0.16-0.21	7.4-8.4	<4	Moderate	0.49		
	27-60	0.2-0.6	0.16-0.21	7.4-8.4	<4	Moderate	0.49		
LcA: Largo	0-5	0.6-2.0	0.13-0.21	7.4-8.4	<2	Low	0.49	5	4L
	5-13	0.6-2.0	0.14-0.18	7.4-8.4	<2	Low	0.32		
	13-60	0.2-0.6	0.16-0.21	7.4-8.4	<2	Moderate	0.49		
LdA: Largo	0-4	0.6-2.0	0.16-0.21	7.4-8.4	<4	Low	0.49	5	4L
	4-21	0.2-0.6	0.16-0.21	7.4-8.4	<4	Moderate	0.49		
	21-60	0.2-0.6	0.16-0.21	7.4-8.4	<4	Moderate	0.49		
LdB: Largo	0-5	0.6-2.0	0.16-0.21	7.4-8.4	<4	Low	0.49	5	4L
	5-25	0.2-0.6	0.16-0.21	7.4-8.4	<4	Moderate	0.49		
	25-60	0.2-0.6	0.16-0.21	7.4-8.4	<4	Moderate	0.49		
LdB2: Largo	0-1	0.6-2.0	0.16-0.21	7.4-8.4	<4	Low	0.49	5	4L
	1-21	0.2-0.6	0.16-0.21	7.4-8.4	<4	Moderate	0.49		
	21-60	0.2-0.6	0.16-0.21	7.4-8.4	<4	Moderate	0.49		
LeA: Largo	0-12	0.6-2.0	0.16-0.21	7.4-8.4	<4	Low	0.49	5	4L
	12-22	0.2-0.6	0.16-0.21	7.4-8.4	<4	Moderate	0.49		
	22-60	0.2-0.6	0.16-0.21	7.4-8.4	<4	Moderate	0.49		
LfB*:									
Largo	0-6	0.6-2.0	0.16-0.21	7.4-8.4	<4	Low	0.49	5	4L
	6-25	0.2-0.6	0.16-0.21	7.4-8.4	<4	Moderate	0.49		
	25-60	0.2-0.6	0.16-0.21	7.4-8.4	<4	Moderate	0.49		
Ogral	0-6	0.6-6.0	0.13-0.17	7.9-8.4	<2	Low	0.43	1	3
	6-18	2.0-6.0	0.08-0.15	7.9-8.4	<2	Low	0.43		
	18-60	2.0-6.0	0.04-0.08	7.9-8.4	<2	Low	0.15		
McB: McCullough	0-5	2.0-6.0	0.11-0.15	7.9-8.4	<2	Low	0.24	5	3
	5-22	2.0-6.0	0.11-0.16	7.9-8.4	<2	Low	0.24		
	22-29	2.0-6.0	0.07-0.09	7.9-8.4	<2	Low	0.17		
	29-60	2.0-6.0	0.11-0.16	7.9-8.4	<2	Low	0.24		
MdA: McCullough Variant	0-7	0.6-2.0	0.13-0.17	7.9-8.4	<2	Low	0.32	5	3
	7-32	0.6-2.0	0.13-0.18	7.9-8.4	<2	Low	0.32		
	32-60	0.2-0.6	0.15-0.21	7.9-8.4	<2	Moderate	0.49		
NaC*:									
Nickel	0-4	2.0-6.0	0.06-0.09	7.9-8.4	<2	Low	0.20	5	---
	4-18	0.2-0.6	0.04-0.07	7.9-8.4	<2	Low	0.17		
	18-60	0.2-0.6	0.04-0.07	7.9-8.4	<2	Low	0.15		
Aztec	0-6	0.6-2.0	0.08-0.15	7.9-8.4	<2	Low	0.20	5	7
	6-26	0.2-0.6	0.07-0.11	7.9-8.4	<2	Low	0.17		
	26-60	2.0-6.0	0.03-0.07	7.4-8.4	4-8	Low	0.15		
PkA: Prelo	0-10	0.6-2.0	0.15-0.17	7.9-8.4	<2	Low	0.32	5	3
	10-38	0.2-0.6	0.19-0.21	7.9-8.4	2-4	Moderate	0.43		
	38-60	0.2-0.6	0.11-0.13	7.9-8.4	4-8	Moderate	0.43		
PlA: Prelo	0-4	0.6-2.0	0.15-0.17	7.9-8.4	<2	Low	0.32	5	3
	4-26	0.2-0.6	0.19-0.21	7.9-8.4	2-4	Moderate	0.43		
	26-60	0.2-0.6	0.11-0.13	7.9-8.4	4-8	Moderate	0.43		
PmA: Prelo	0-8	0.6-2.0	0.19-0.21	7.9-8.4	<2	Low	0.43	5	4L
	8-22	0.2-0.6	0.19-0.21	7.9-8.4	2-4	Moderate	0.43		
	22-50	0.2-0.6	0.11-0.13	7.9-8.4	4-8	Moderate	0.43		
PmB: Prelo	0-6	0.6-2.0	0.19-0.21	7.9-8.4	<2	Low	0.43	5	4L
	6-20	0.2-0.6	0.19-0.21	7.9-8.4	2-4	Moderate	0.43		
	20-60	0.2-0.6	0.11-0.13	7.9-8.4	4-8	Moderate	0.43		

See footnote at end of table.

TABLE 22.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS IN HIGH DETAIL MAP UNITS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group
	In	In/hr	In/in	pH	Mmhos/cm				
PmB2-------------- Prelo	0-2	0.6-2.0	0.19-0.21	7.9-8.4	<2	Low--------	0.43	5	4L
	2-8	0.2-0.6	0.19-0.21	7.9-8.4	2-4	Moderate	0.43		
	8-60	0.2-0.6	0.11-0.13	7.9-8.4	4-8	Moderate	0.43		
PnA--------------- Prelo	0-4	0.6-2.0	0.19-0.21	7.9-8.4	<2	Low--------	0.43	5	4L
	4-28	0.2-0.6	0.19-0.21	7.9-8.4	2-4	Moderate	0.43		
	28-60	0.2-0.6	0.11-0.13	7.9-8.4	4-8	Moderate	0.43		
PpA--------------- Prelo	0-12	0.6-2.0	0.19-0.21	7.9-8.4	<2	Low--------	0.43	5	4L
	12-32	0.2-0.6	0.19-0.21	7.9-8.4	2-4	Moderate	0.43		
	32-60	0.2-0.6	0.11-0.13	7.9-8.4	4-8	Moderate	0.43		
PvB*:									
Prelo------------	0-9	0.6-2.0	0.19-0.21	7.9-8.4	<2	Low--------	0.43	5	4L
	9-24	0.2-0.6	0.19-0.21	7.9-8.4	2-4	Moderate	0.43		
	24-60	0.2-0.6	0.11-0.13	7.9-8.4	4-8	Moderate	0.43		
Prelo Variant----	0-7	0.6-2.0	0.15-0.21	7.9-8.4	<2	Low--------	0.32	2	4L
	7-22	0.2-0.6	0.15-0.21	7.9-8.4	2-4	Moderate	0.43		
	22-30	0.2-0.6	0.11-0.13	7.9-8.4	4-8	Moderate	0.43		
	30-60	2.0-6.0	0.06-0.09	7.9-8.4	4-8	Low--------	0.15		
RbA--------------- Reeves	0-8	0.6-2.0	0.16-0.18	7.4-8.4	2-8	Low--------	0.49	2	4L
	8-32	0.6-2.0	0.19-0.21	7.4-8.4	2-8	Moderate	0.37		
	32-60	0.6-2.0	0.05-0.08	7.4-8.4	4-8	Low--------	0.49		
RcB2-------------- Reeves	0-2	0.6-2.0	0.16-0.18	7.4-8.4	2-8	Low--------	0.49	2	4L
	2-27	0.6-2.0	0.19-0.21	7.4-8.4	2-8	Moderate	0.37		
	27-60	0.6-2.0	0.05-0.08	7.4-8.4	4-8	Low--------	0.49		
RdA--------------- Reeves	0-10	0.6-2.0	0.14-0.19	7.9-8.4	2-4	Low--------	0.49	2	4L
	10-35	0.6-2.0	0.12-0.16	7.9-8.4	2-8	Moderate	0.43		
	35-60	0.6-2.0	0.10-0.14	7.9-8.4	4-8	Moderate	0.43		
TbA--------------- Tobler	0-2	0.6-2.0	0.13-0.20	7.9-8.4	<2	Low--------	0.37	5	4L
	2-50	0.6-2.0	0.13-0.15	7.9-8.4	<2	Low--------	0.32		
	50-60	0.2-0.6	0.19-0.21	7.9-8.4	<2	Moderate	0.43		
TcA--------------- Tome	0-6	0.2-2.0	0.18-0.20	7.9-8.4	<2	Low--------	0.43	5	4L
	6-60	0.2-0.6	0.16-0.18	7.9-8.4	<2	Moderate	0.43		
TcB--------------- Tome	0-3	0.2-2.0	0.18-0.20	7.9-8.4	<2	Low--------	0.43	5	4L
	3-60	0.2-0.6	0.16-0.18	7.9-8.4	<2	Moderate	0.43		
TeB--------------- Tome	0-6	0.2-2.0	0.18-0.20	7.9-8.4	<2	Low--------	0.43	5	4L
	6-60	0.2-0.6	0.16-0.18	7.9-8.4	<2	Moderate	0.43		
TfB*:									
Tome-------------	0-5	0.2-2.0	0.18-0.20	7.9-8.4	<2	Low--------	0.43	5	4L
	5-60	0.2-0.6	0.16-0.18	7.9-8.4	<2	Moderate	0.43		
Emot-------------	0-4	2.0-6.0	0.07-0.13	7.9-8.4	<2	Low--------	0.24	2	---
	4-11	2.0-6.0	0.13-0.17	7.9-8.4	<2	Low--------	0.28		
	11-60	2.0-6.0	0.10-0.13	7.9-8.4	<2	Low--------	0.17		
TvA*. Torrifluvents									
UaA*. Ustic Torriorthents									

* See map unit description for the composition and behavior of the map unit.

TABLE 23.--SOIL AND WATER FEATURES OF LOW DETAIL MAP UNITS

[Absence of an entry indicates the feature is not a concern. See Glossary for descriptions of symbols and such terms as "rare," "brief," and "perched." The symbol < means less than; > means greater than]

Soil name and map symbol	Hydro-logic group	Flooding			Bedrock		Cemented pan		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Hard-ness	Depth	Hard-ness		Uncoated steel	Concrete
					In		In				
AEC*:											
Alamogordo-------	B	None--------	---	---	>60	---	---	---	---	High-----	High.
Gypsum land.											
AGE*:											
Alamogordo-------	B	None--------	---	---	>60	---	---	---	---	High-----	High.
Gypsum land.											
Aztec------------	B	None--------	---	---	>60	---	---	---	---	High-----	High.
AMC--------------- Armesa	B	None--------	---	---	>60	---	---	---	---	High-----	Low.
AZF*:											
Aztec------------	B	None--------	---	---	>60	---	---	---	---	High-----	High.
Rock outcrop.											
Lozier-----------	D	None--------	---	---	7-20	Hard	---	---	---	High-----	Low.
BAF*. Badland											
BOA*:											
Bluepoint--------	A	Rare--------	---	---	>60	---	---	---	---	High-----	High.
Onite------------	B	None--------	---	---	>60	---	---	---	---	Moderate	Low.
Wink-------------	B	None--------	---	---	>60	---	---	---	---	High-----	Low.
BRF--------------- Borrego	D	None--------	---	---	14-20	Hard	---	---	Moderate	High-----	Low.
CFA--------------- Crowflats	B	Common------	Very brief	Jun-Sep	>60	---	---	---	---	High-----	Low.
DEB, DEF---------- Deama	C	None--------	---	---	7-20	Hard	---	---	Low------	Moderate	Low.
DRF*, DRG*:											
Deama------------	C	None--------	---	---	7-20	Hard	---	---	Low------	Moderate	Low.
Rock outcrop.											
DSF*:											
Deama------------	C	None--------	---	---	7-20	Hard	---	---	Low------	Moderate	Low.
Rock outcrop.											
Holloman Variant-	C	None--------	---	---	8-20	Rip-pable	---	---	- -	High-----	High.
DTB*:											
Dona Ana---------	[illegible]	None--------	---	---	>60	---	---	---	- -	High-----	Low.
Berino-----------	B	None--------	---	---	>60	---	---	---	- -	High-----	Low.
DYE*:											
Dye--------------	D	None--------	---	---	10-20	Hard	---	---	Low------	High-----	Low.
Encierro---------	D	None--------	---	---	10-20	Hard	---	---	Low------	High-----	Low.
ECF*:											
Ector------------	D	None--------	---	---	4-20	Hard	---	---	- -	High-----	Low.

See footnote at end of table.

TABLE 23.--SOIL AND WATER FEATURES OF LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Hydro-logic group	Flooding			Bedrock		Cemented pan		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Hard-ness	Depth	Hard-ness		Uncoated steel	Concrete
					In		In				
ECF*: Rock outcrop.											
ESB*: Espy	C	None	---	---	40-60	Rip-pable	11-20	Rip-pable	---	High	Low.
Shanta Variant	B	None	---	---	>60	---	---	---	---	High	Low.
GZB*: Gypsum land.											
Holloman	C	None	---	---	4-20	Rip-pable	---	---	---	High	High.
HOB*: Holloman	C	None	---	---	4-20	Rip-pable	---	---	---	High	High.
Gypsum land.											
Yesum	B	None	---	---	>60	---	---	---	---	High	High.
HPB*: Holloman	C	None	---	---	4-20	Rip-pable	---	---	---	High	High.
Reeves	C	None	---	---	>60	---	---	---	---	High	High.
JAB*: Jal	B	None	---	---	>60	---	---	---	---	High	Low.
Tome	C	Rare	---	---	>60	---	---	---	---	High	Low.
JEC*: Jerag	D	None	---	---	>60	---	14-20	Rip-pable	---	High	Low.
Philder	D	None	---	---	>60	---	12-20	Rip-pable	---	High	Low.
Armesa	B	None	---	---	>60	---	---	---	---	High	Low.
LAB* La Fonda	B	None	---	---	>60	---	---	---	---	High	Low.
LDB Largo	B	Rare to occasional.	Very brief	Jun-Oct	>60	---	---	---	---	High	Low.
LGB*: Largo	B	Rare to occasional.	Very brief	Jun-Oct	>60	---	---	---	---	High	Low.
Ogral	B	None	---	---	>60	---	---	---	---	High	Low.
LOB*, LOD*: Lozier	D	None	---	---	4-20	Hard	---	---	---	High	Low.
Rock outcrop.											
MEA Mead	D	Occasional	Very brief	Jun-Oct	>60	---	---	---	Low	High	High.
MJA*: Mimbres	C	Rare to common.	Very brief	Jul-Sep	>60	---	---	---	---	High	Low.
Jal	B	None	---	---	>60	---	---	---	---	High	Low.

See footnote at end of table.

TABLE 23.--SOIL AND WATER FEATURES OF LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Hydro-logic group	Flooding			Bedrock		Cemented pan		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Hard-ness	Depth	Hard-ness		Uncoated steel	Concrete
					In		In				
MPA*:											
Mimbres----------	C	Rare to common.	Very brief	Jul-Sep	>60	---	---	---	---	High-----	Low.
Prelo------------	B	None to rare	---	---	>60	---	---	---	---	High-----	High.
MTA*:											
Mimbres----------	C	Rare to common.	Very brief	Jul-Sep	>60	---	---	---	---	High-----	Low.
Tome-------------	C	Rare---------	---	---	>60	---	---	---	---	High-----	Low.
MXC--------------- Montecito	C	None---------	---	---	>60	---	---	---	Low------	High-----	Low.
NTD*:											
Nickel-----------	B	None---------	---	---	>60	---	---	---	---	High-----	Low.
Tencee-----------	D	None---------	---	---	>60	---	7-20	Hard	---	High-----	Low.
OPB*:											
Onite------------	B	None---------	---	---	>60	---	---	---	---	Moderate	Low.
Pintura----------	A	None---------	---	---	>60	---	---	---	---	High-----	Low.
PAE*:											
Pena-------------	B	None---------	---	---	>60	---	---	---	Moderate	High-----	Low.
Aztec variant----	B	None---------	---	---	>60	---	---	---	Low------	High-----	High.
PCB*:											
Pena-------------	B	None---------	---	---	>60	---	---	---	Moderate	High-----	Low.
Cale-------------	B	None---------	---	---	>60	---	---	---	Moderate	High-----	Low.
Kerrick----------	B	None---------	---	---	>60	---	21-40	Rip-pable	---	Moderate	Low.
PDF*:											
Pena Variant-----	B	None---------	---	---	>60	---	---	---	---	High-----	Low.
Rock outcrop.											
PEC--------------- Philder	D	None---------	---	---	>60	---	12-20	Rip-pable	---	High-----	Low.
PFB*:											
Philder----------	D	None---------	---	---	>60	---	12-20	Rip-pable	---	High-----	Low.
Armesa-----------	B	None---------	---	---	>60	---	---	---	---	High-----	Low.
PGB*:											
Pintura----------	A	None---------	---	---	>60	---	---	---	---	High-----	Low.
Dona Ana---------	B	None---------	---	---	>60	---	---	---	---	High-----	Low.
PHB*:											
Pintura----------	A	None---------	---	---	>60	---	---	---	---	High-----	Low.
Tome-------------	C	Rare---------	---	---	>60	---	---	---	---	High-----	Low.
Dona Ana---------	B	None---------	---	---	>60	---	---	---	---	High-----	Low.
POB--------------- Prelo	B	None to rare	---	---	>60	---	---	---	---	High-----	High.
RAB*:											
Reakor-----------	B	None---------	---	---	>60	---	---	---	---	High-----	Low.

See footnote at end of table.

TABLE 23.--SOIL AND WATER FEATURES OF LOW DETAIL MAP UNITS--Continued

Soil name and map symbol	Hydro-logic group	Flooding			Bedrock		Cemented pan		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Hard-ness	Depth	Hard-ness		Uncoated steel	Concrete
					In		In				
RAB*:											
Tome	C	Rare	---	---	>60	---	---	---	---	High	Low.
Tencee	D	None	---	---	>60	---	7-20	Hard	---	High	Low.
REB*:											
Reeves Variant	B	None	---	---	>60	---	---	---	---	High	High.
Shanta	B	None to rare	---	---	>60	---	---	---	Moderate	High	Low.
RFA*:											
Reyab	B	None to rare	---	---	>60	---	---	---	---	High	Low.
Armesa	B	None	---	---	>60	---	---	---	---	High	Low.
ROG*.											
Rock outcrop											
RPG*:											
Rock outcrop.											
Deama	C	None	---	---	7-20	Hard	---	---	Low	Moderate	Low.
RRF*:											
Rock outcrop.											
Lozier	D	None	---	---	4-20	Hard	---	---	---	High	Low.
RTE*:											
Rock outcrop.											
Tortugas	D	None	---	---	6-20	Hard	---	---	---	Moderate	Low.
Ustifluvents.											
RUA*:											
Ruidoso	C	None	---	---	>60	---	---	---	Low	High	Low.
SGA*:											
Shanta	B	Occasional	Very brief	May-Oct	>60	---	---	---	Moderate	Moderate	Low.
Gabaldon	B	None to rare	---	---	>60	---	---	---	Moderate	Moderate	Low.
TAC Tencee	D	None	---	---	>60	---	7-20	Hard	---	High	Low.
TDB Tome	C	Rare	---	---	>60	---	---	---	---	High	Low.
TOE Tortugas	D	None	---	---	6-20	Hard	---	---	---	Moderate	Low.
TPE*, TPG*:											
Tortugas	D	None	---	---	6-20	Hard	---	---	---	Moderate	Low.
Deama	C	None	---	---	7-20	Hard	---	---	Low	Moderate	Low.

* See map unit description for the composition and behavior of the map unit.

TABLE 24.--SOIL AND WATER FEATURES OF HIGH DETAIL MAP UNITS

[Absence of an entry indicates the feature is not a concern. See Glossary for descriptions of symbols and such terms as "rare," "brief," and "perched." The symbol < means less than; > means greater than]

Soil name and map symbol	Hydro-logic group	Flooding			Bedrock		Cemented pan		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Hard-ness	Depth	Hard-ness		Uncoated steel	Concrete
					In		In				
AbB, AcA---------- Alamogordo	B	None--------	---	---	>60	---	---	---	---	High-----	High.
AdB*:											
Alamogordo-------	B	None--------	---	---	>60	---	---	---	---	High-----	High.
Aztec------------	B	None--------	---	---	>60	---	---	---	---	High-----	High.
AhB*:											
Alamogordo-------	B	None--------	---	---	>60	---	---	---	---	High-----	High.
McCullough-------	B	None--------	---	---	>60	---	---	---	---	High-----	Low.
AkA--------------- Alamogordo Variant	B	None--------	---	---	>60	---	---	---	---	High-----	High.
AnD--------------- Aztec	B	None--------	---	---	>60	---	---	---	---	High-----	High.
AoB*:											
Aztec------------	B	None--------	---	---	>60	---	---	---	---	High-----	High.
Alamogordo-------	B	None--------	---	---	>60	---	---	---	---	High-----	High.
Gu*. Gullied land											
GyC*, GyE*. Gypsum land											
HbA--------------- Holloman	C	None--------	---	---	4-20	Rip-pable	---	---	---	High-----	High.
HcA*:											
Holloman---------	C	None--------	---	---	4-20	Rip-pable	---	---	---	High-----	High.
Gypsum land.											
LbB--------------- Largo	B	Rare to occasional.	Very brief	Jun-Oct	>60	---	---	---	---	High-----	Low.
LcA--------------- Largo	B	None--------	---	---	>60	---	---	---	---	High-----	Low.
LdA, LdB, LdB2, LeA-------------- Largo	B	Rare to occasional.	Very brief	Jun-Oct	>60	---	---	---	---	High-----	Low.
LfB*:											
Largo------------	B	Rare to occasional.	Very brief	Jun-Oct	>60	---	---	---	---	High-----	Low.
Ogral------------	B	None--------	---	---	>60	---	---	---	---	High-----	Low.
McB--------------- McCullough	B	None--------	---	---	>60	---	---	---	---	High-----	Low.
MdA--------------- McCullough Variant	B	None--------	---	---	>60	---	---	---	---	High-----	Low.
NaC*:											
Nickel-----------	B	None--------	---	---	>60	---	---	---	---	High-----	Low.

See footnote at end of table.

TABLE 24.--SOIL AND WATER FEATURES OF HIGH DETAIL MAP UNITS--Continued

Soil name and map symbol	Hydro-logic group	Flooding			Bedrock		Cemented pan		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Hard-ness	Depth	Hard-ness		Uncoated steel	Concrete
					In		In				
NaC*:											
Aztec	B	None	---	---	>60	---	---	---	---	High	High.
PkA, PlA, PmA, PmB, PmB2, PnA, PpA Prelo	B	None to rare	---	---	>60	---	---	---	---	High	High.
PvB*:											
Prelo	B	None to rare	---	---	>60	---	---	---	---	High	High.
Prelo Variant	B	None to rare	---	---	>60	---	---	---	---	High	High.
RbA, RcB2 Reeves	C	None	---	---	>60	---	---	---	---	High	High.
RdA Reeves	C	Common	Very brief	Jun-Sep	>60	---	---	---	---	High	High.
TbA Tobler	B	Occasional	Very brief	Jun-Sep	>60	---	---	---	---	High	Low.
TcA, TcB, TeB Tome.	C	Rare	---	---	>60	---	---	---	---	High	Low.
TfB*:											
Tome	C	Rare	---	---	>60	---	---	---	---	High	Low.
Emot	B	None	---	---	>60	---	---	---	---	Moderate	Low.
TvA*. Torrifluvents											
UaA*. Ustic Torriorthents											

* See map unit description for the composition and behavior of the map unit.

TABLE 25.--ENGINEERING TEST DATA

Soil name and location	New Mexico report No.	Depth from surface	Mechanical analysis: Percentage smaller than--- 2 in.	1 in.	3/4 in.	5/8 in.	Percentage passing sieve-- No. 4	No. 10	No. 40	No. 200	Liquid limit	Plasticity index	Classification: AASHTO	Unified
											Pct			
Alamogordo very fine sandy loam: NE1/4SE1/4 sec. 29, T. 15 S., R. 10 E.	0031	0-7	100	100	99	97	96	95	92	56	NP	NP	A-4(0)	ML
	0032	7-15	100	100	100	100	100	100	94	73	NP	NP	A-4(0)	ML
	0033	15-60	100	100	100	100	100	100	97	74	NP	NP	A-4(0)	ML
Armesa very fine sandy loam: about 300 feet north of County Road 506 where it intersects southwest corner of sec. 10, T. 21 S., R. 11 E.	0064	3-14	100	100	100	100	100	100	59	50	NP	NP	A-4(0)	ML
Crowflats silt loam: SE1/4 sec. 19, T. 22 S., R. 18 E.	0066	0-4	100	100	100	100	100	100	98	93	33	8	A-4(8)	ML
	0067	17-28	100	100	100	100	100	100	99	94	NP	NP	A-4(0)	ML
	0068	28-60	100	100	100	100	100	100	99	90	33	11	A-6(9)	CL
Dona Ana fine sandy loam: 5 miles north of Oro Grande along bar ditch on U.S. Highway 54; sec. 30, T. 21 S., R. 9 E.	0061	0-3	100	100	100	100	100	100	98	48	NP	NP	A-4(0)	SM
	0062	10-16	100	99	98	96	95	91	82	36	NP	NP	A-4(0)	SM
	0063	21-37	100	100	100	100	100	100	90	45	23	6	A-4(0)	SC-SM
Jerag very fine sandy loam: SW1/4NW1/4 sec. 14, T. 26 S., R. 11 E.	0053	0-3	100	100	100	100	100	100	99	45	NP	NP	A-4(0)	SM
	0054	9-19	100	56	53	49	47	45	43	26	31	10	A-2-4(0)	GC
Largo very fine sandy loam: from bridge north of La Luz, 1.3 miles north on dirt road, left road 0.15 miles west, on south side of arroyo; NE1/4 sec. 22, T. 15 S., R. 10 E.	0046	1-13	100	100	100	100	100	100	93	52	NP	NP	A-4(0)	ML
	0047	13-60	100	100	100	100	100	100	96	74	NP	NP	A-4(0)	ML
McCullough sandy loam: SE1/4 sec. 16, T. 15 S., R. 10 E.	0028	5-22	100	100	100	100	100	100	89	44	NP	NP	A-4(0)	SM
	0029	22-29	100	95	91	77	67	59	35	12	NP	NP	A-1-b(0)	SP-SM
	0030	29-60	100	97	96	94	93	92	85	46	NP	NP	A-4(0)	SM
McCullough Variant very fine sandy loam: SW1/4NW1/4 sec. 29, T. 15 S., R. 10 E.	0034	7-15	100	100	100	100	100	100	99	76	NP	NP	A-4(0)	ML
	0035	15-32	100	100	100	100	100	100	99	85	NP	NP	A-4(0)	ML
	0036	32-50	100	100	100	100	100	100	98	91	NP	NP	A-4(0)	ML
Nickel gravelly silt loam: 1.55 miles south on Florida Street from intersection with U.S. 82, about 0.1 mile west of road on slight rise; SE1/4 sec. 6, T. 16 S., R. 11 E.	0040	0-7	100	98	92	79	73	69	63	40	NP	NP	A-4(0)	SM
	0041	7-26	100	89	76	58	46	39	29	14	NP	NP	A-1-a(0)	GM
	0042	30-40	100	94	83	59	41	31	17	6	NP	NP	A-1-a(0)	GP-GM

TABLE 25.--ENGINEERING TEST DATA--Continued

Soil name and location	New Mexico report No.	Depth from surface	Mechanical analysis: Percentage smaller than--- 2 in.	1 in.	3/4 in.	5/8 in.	Percentage passing sieve-- No. 4	No. 10	No. 40	No. 200	Liquid limit	Plasticity index	Classification: AASHTO	Unified
											Pct			
Philder very fine sandy loam:														
NW1/4 sec. 23,	0056	0-4	100	100	100	100	100	100	99	40	NP	NP	A-4(0)	SM
T. 26 S., R. 11 E.	0057	4-10	100	100	100	96	94	91	86	46	NP	NP	A-4(0)	SM
	0058	10-20	92	70	62	50	40	33	28	13	NP	NP	A-1-a(0)	GM
Pintura loamy fine sand:														
200 feet west of the	0051	0-12	100	100	100	100	100	100	99	21	NP	NP	A-2-4(0)	SM
Escondia siding; northwest corner NW1/4 sec. 10, T. 20 S., R. 9 E.	0052	12-30	100	100	100	100	100	100	96	9	NP	NP	A-3(0)	SP-SM
Prelo silt loam:														
3.15 miles east from	0037	0-4	100	100	100	100	100	100	99	93	27	8	A-4(6)	CL
intersection of U.S. 54	0038	4-15	100	100	100	100	100	100	99	95	32	10	A-4(9)	CL
and 70 and La Luz cut-off toward La Luz Gate of White Sands Missle Range to farm road intersection and 50 feet north of road.	0039	15-50	100	100	100	100	100	100	99	96	33	9	A-4(9)	CL

TABLE 26.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Alamogordo	Coarse-loamy, gypsic, thermic Typic Gypsiorthids
Alamogordo Variant	Fine-loamy, mixed, thermic Cambic Gypsiorthids
Armesa	Fine-loamy, carbonatic, thermic Ustollic Calciorthids
Aztec	Loamy-skeletal, mixed, thermic Cambic Gypsiorthids
Aztec Variant	Loamy-skeletal, mixed, mesic Cambic Gypsiorthids
Berino	Fine-loamy, mixed, thermic Typic Haplargids
Bluepoint	Mixed, thermic Typic Torripsamments
Borrego	Clayey, mixed Lithic Eutroboralfs
Cale	Fine-silty, mixed, mesic Aridic Argiustolls
Crowflats	Fine-silty, mixed (calcareous), thermic Ustic Torrifluvents
Deama	Loamy-skeletal, carbonatic, mesic Lithic Calciustolls
Dona Ana	Fine-loamy, mixed, thermic Typic Haplargids
Dye	Clayey, mixed, mesic Lithic Haplustalfs
Ector	Loamy-skeletal, carbonatic, thermic Lithic Calciustolls
Emot	Loamy-skeletal, mixed (calcareous), thermic Typic Torriorthents
Encierro	Clayey, mixed, mesic Lithic Argiustolls
Espy	Loamy, mixed, thermic, shallow Petrocalcic Calciustolls
Gabaldon	Fine-silty, mixed, mesic Cumulic Haplustolls
Holloman	Loamy, gypsic, thermic, shallow Typic Torriorthents
Holloman Variant	Loamy, mixed, mesic, shallow Typic Haplustolls
Jal	Fine-loamy, carbonatic, thermic Typic Calciorthids
Jerag	Loamy, mixed, thermic, shallow Petrocalcic Ustalfic Paleargids
Kerrick	Fine-loamy, mixed, mesic Petrocalcic Calciustolls
La Fonda	Fine-loamy, mixed, mesic Ustollic Camborthids
Largo	Fine-silty, mixed (calcareous), thermic Typic Torriorthents
Lozier	Loamy-skeletal, carbonatic, thermic Lithic Calciorthids
McCullough	Coarse-loamy, mixed (calcareous), thermic Typic Torriorthents
McCullough Variant	Fine-loamy, mixed (calcareous), thermic Typic Torriothents
Mead	Fine, mixed, thermic Typic Salorthids
Mimbres	Fine-silty, mixed, thermic Typic Camborthids
Montecito	Fine, mixed, mesic Aridic Haplustalfs
Nickel	Loamy-skeletal, mixed, thermic Typic Calciorthids
Ogral	Loamy-skeletal, mixed (calcareous), thermic Typic Torriorthents
Onite	Coarse-loamy, mixed, thermic Typic Haplargids
Pena	Loamy-skeletal, mixed, mesic Aridic Calciustolls
Pena Variant	Loamy-skeletal, mixed, mesic Pachic Haplustolls
Philder	Loamy-skeletal, carbonatic, thermic, shallow Ustochreptic Paleorthids
Pintura	Mixed, thermic Typic Torripsamments
Prelo	Fine-silty, mixed, thermic Typic Camborthids
Prelo Variant	Fine-loamy, mixed, thermic Typic Camborthids
Reakor	Fine-silty, mixed, thermic Typic Calciorthids
Reeves	Fine-loamy, gypsic, thermic Typic Gypsiorthids
Reeves Variant	Fine-loamy, mixed, mesic Aridic Calciustolls
Reyab	Fine-silty, mixed (calcareous), thermic Ustic Torriorthents
Ruidoso	Fine, mixed, mesic Pachic Argiustolls
Shanta	Fine-loamy, mixed, mesic Cumulic Haplustolls
Shanta Variant	Fine-loamy, mixed, thermic Aridic Haplustolls
Tencee	Loamy-skeletal, carbonatic, thermic, shallow Typic Paleorthids
Tobler	Coarse-loamy, mixed (calcareous), thermic Typic Torrifluvents
Tome	Fine-silty, mixed (calcareous), thermic Typic Torriorthents
Tortugas	Loamy-skeletal, carbonatic, mesic Lithic Haplustolls
Wink	Coarse-loamy, mixed, thermic Typic Calciorthids
Yesum	Coarse-loamy, gypsic, thermic Typic Gypsiorthids

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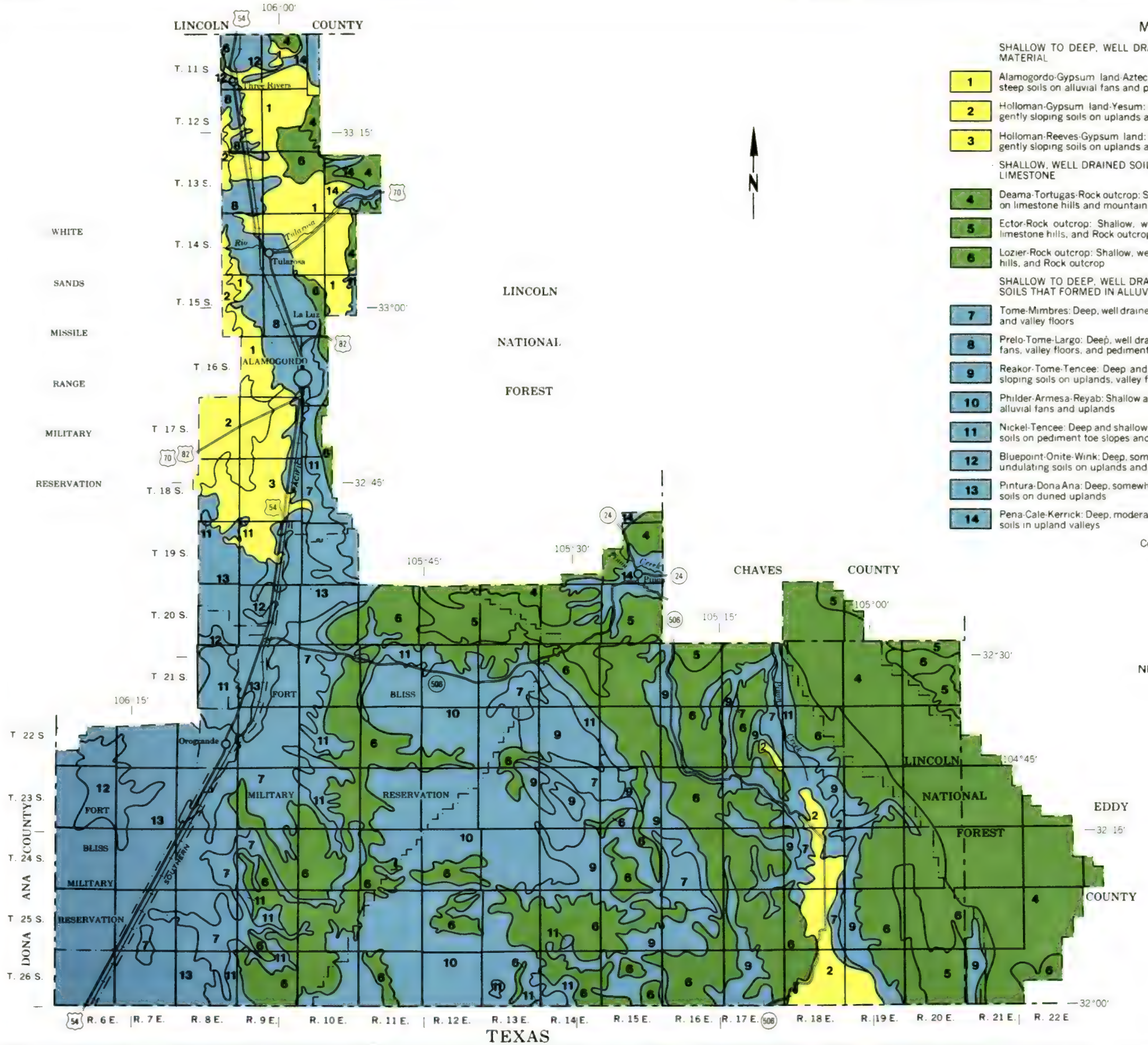


MAP UNITS

SHALLOW TO DEEP, WELL DRAINED SOILS THAT FORMED IN GYPSIFEROUS MATERIAL

1 Alamogordo-Gypsum land-Aztec: Deep, well drained, nearly level to moderately steep soils on alluvial fans and pediments, and Gypsum land

2 Holloman-Gypsum land-Yesum: Shallow and deep, well drained, nearly level to gently sloping soils on uplands and basin floors, and Gypsum land

3 Holloman-Reeves-Gypsum land: Shallow and deep, well drained, nearly level to gently sloping soils on uplands and valley floors, and Gypsum land

SHALLOW, WELL DRAINED SOILS THAT FORMED IN MATERIAL DERIVED FROM LIMESTONE

4 Deama-Tortugas-Rock outcrop: Shallow, well drained, nearly level to very steep soils on limestone hills and mountains, and Rock outcrop

5 Ector-Rock outcrop: Shallow, well drained, moderately steep to steep soils on limestone hills, and Rock outcrop

6 Lozier-Rock outcrop: Shallow, well drained, nearly level to steep soils on limestone hills, and Rock outcrop

SHALLOW TO DEEP, WELL DRAINED AND SOMEWHAT EXCESSIVELY DRAINED SOILS THAT FORMED IN ALLUVIAL AND EOLIAN MATERIAL

7 Tome-Mimbres: Deep, well drained, nearly level to gently sloping soils on alluvial fans and valley floors

8 Prelo-Tome-Largo: Deep, well drained, nearly level to gently sloping soils on alluvial fans, valley floors, and pediments

9 Reakor-Tome-Tencee: Deep and shallow, well drained, nearly level to moderately sloping soils on uplands, valley floors, and pediment toe slopes

10 Philder-Armesa-Reyab: Shallow and deep, well drained, nearly level to rolling soils on alluvial fans and uplands

11 Nickel-Tencee: Deep and shallow, well drained, strongly sloping to moderately steep soils on pediment toe slopes and alluvial fans

12 Bluepoint-Onite-Wink: Deep, somewhat excessively drained and well drained, level to undulating soils on uplands and alluvial fans

13 Pintura-Dona Ana: Deep, somewhat excessively drained and well drained, undulating soils on duned uplands

14 Pena-Cale-Kerrick: Deep, moderately well drained, nearly level to moderately sloping soils in upland valleys

Compiled 1979

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
FOREST SERVICE
NEW MEXICO STATE UNIVERSITY AGRICULTURAL EXPERIMENT STATION

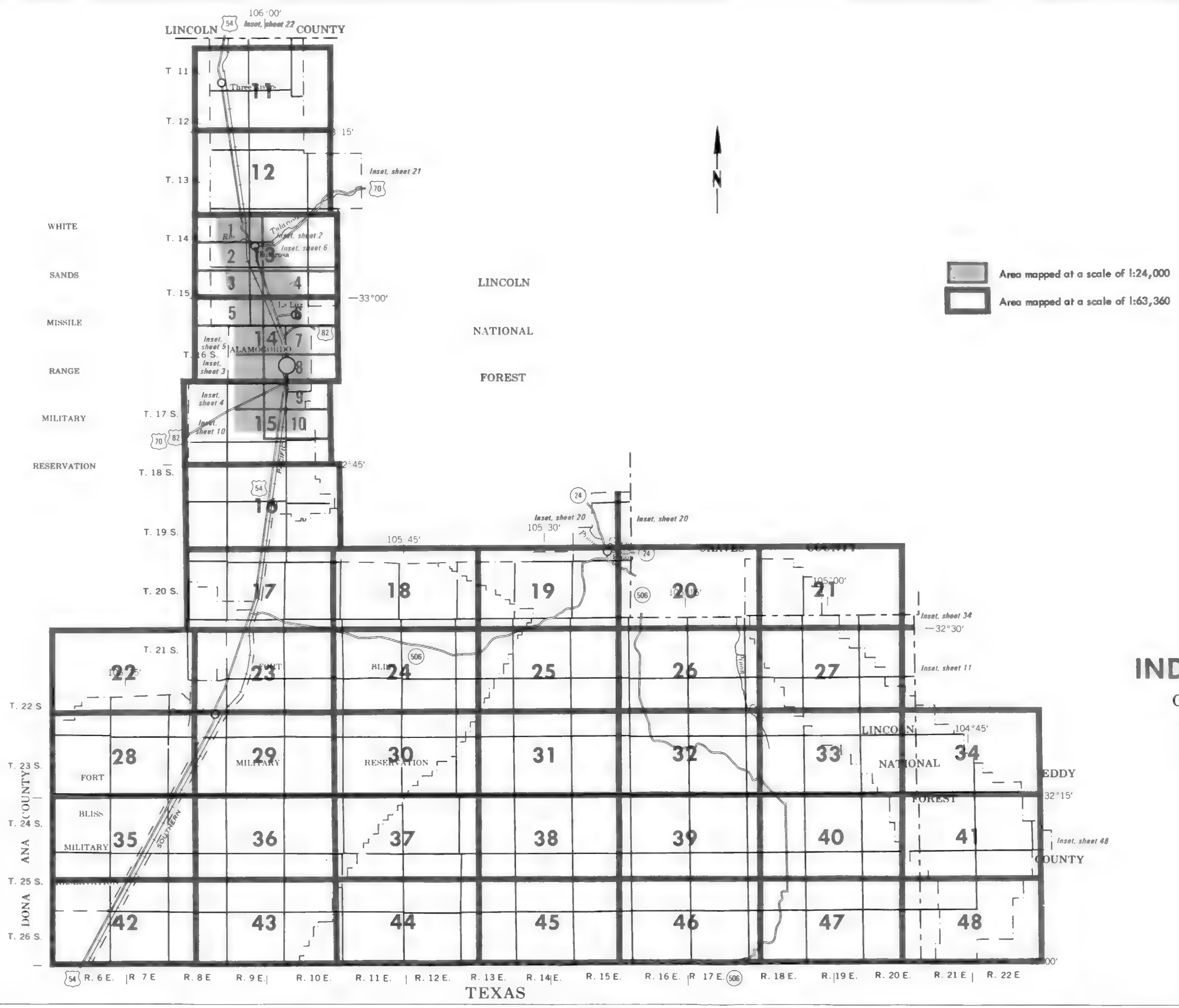
GENERAL SOIL MAP

OTERO AREA, NEW MEXICO
PARTS OF OTERO, EDDY, AND CHAVES COUNTIES

Scale 1:633,600

0 1 2 3 4 5 Miles

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.



INDEX TO MAP SHEETS

OTERO AREA, NEW MEXICO
PARTS OF OTERO, EDDY, AND CHAVES COUNTIES

Scale 1:633,600

0 1 2 3 4 5 Miles

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline & neatline

AD HOC BOUNDARY (label)

- Small airport, airfield, park, oilfield, cemetery, or flood pool — Davis Airstrip; FLOOD POOL LINE

STATE COORDINATE TICK

LAND DIVISION CORNERS (sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEMS & DESIGNATIONS

- Interstate
- Federal
- State
- County, farm or ranch

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or small — water; w

PITS

- Gravel pit — G.P.
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban areas)
- Church
- School
- Indian mound (label) — Indian Mound
- Located object (label) — Tower
- Tank (label) — GAS
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double line (label) — CANAL
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial — water; w
- Intermittent — int

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS — SvE 107

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

GULLY

DEPRESSION OR SINK

SOIL SAMPLE SITE (normally not shown)

MISCELLANEOUS

- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot
- Overblown soil

SOIL LEGEND

The first letter, always a capital, is the initial letter of the soil name. The second letter is a capital if the mapping unit is broadly defined, otherwise it is a small letter. The third letter always a capital, A, B, C, D, E, F, or G, shows the slope. Slope letters are omitted on some symbols for miscellaneous areas. A final number, 2, in the symbol shows that the soil has been eroded

SYMBOL	NAME
AbB	Alamogordo very fine sandy loam, 0 to 3 percent slopes
AcA	Alamogordo silt loam, 0 to 1 percent slopes
AdB	Alamogordo-Aztec complex, 1 to 3 percent slopes
AEC	Alamogordo-Gypsum land complex, 0 to 5 percent slopes
AGE	Alamogordo-Gypsum land-Aztec complex, 15 to 50 percent slopes
AhB	Alamogordo-McCullough sandy loams, hummocky, 0 to 3 percent slopes
AkA	Alamogordo Variant very fine sandy loam, 0 to 1 percent slopes
AMC	Armesa very fine sandy loam, 0 to 5 percent slopes
AnD	Aztec gravelly fine sandy loam, 3 to 12 percent slopes
AoB	Aztec-Alamogordo complex, hummocky, 1 to 3 percent slopes
AZF	Aztec Rock outcrop-Lozier complex, 20 to 65 percent slopes
BAF	Badland
BOA	Bluepoint-Onite-Wink association, nearly level
BRF	Borrego cobbly loam, 15 to 40 percent slopes
CFA	Crowflats silt loam, 0 to 2 percent slopes
DEB	Deama gravelly loam, 0 to 5 percent slopes
DEF	Deama gravelly loam, 5 to 30 percent slopes
DRF	Deama-Rock outcrop complex, 20 to 50 percent slopes
DRG	Deama-Rock outcrop complex, 50 to 150 percent slopes
DSF	Deama-Rock outcrop-Holloman Variant complex, 15 to 65 percent slopes
DTB	Dona Ana Berino association, gently sloping
DYE	Dye-Encierro complex, 5 to 30 percent slopes
ECF	Ector-Rock outcrop complex, 20 to 50 percent slopes
ESB	Espy-Shanta Variant association, gently sloping
Gu	Gullied land
GyC	Gypsum land, 0 to 9 percent slopes
GyE	Gypsum land, 9 to 35 percent slopes
GZB	Gypsum land-Holloman complex, 0 to 5 percent slopes
HbA	Holloman very fine sandy loam, 0 to 1 percent slopes
HcA	Holloman-Gypsum land complex, 0 to 1 percent slopes
HOB	Holloman-Gypsum land-Yesum complex, 0 to 5 percent slopes
HPB	Holloman-Reeves association, nearly level
JAB	Jal-Tome association, nearly level
JEC	Jerag-Philder association, gently rolling
LAB	La Fonda association, gently sloping
LbB	Largo sandy loam, 1 to 3 percent slopes
LcA	Largo very fine sandy loam, thick surface, 0 to 1 percent slopes
LdA	Largo silt loam, 0 to 1 percent slopes
LdB	Largo silt loam, 1 to 3 percent slopes
LDB	Largo silt loam, 0 to 3 percent slopes
LdB2	Largo silt loam, 1 to 3 percent slopes, eroded
LeA	Largo silt loam, frequent overflow, 0 to 1 percent slopes
LfB	Largo-Ogral complex, 1 to 3 percent slopes
LGB	Largo-Ogral complex, 0 to 5 percent slopes
LOB	Lozier-Rock outcrop complex, 0 to 5 percent slopes
LOD	Lozier-Rock outcrop complex, 5 to 20 percent slopes
McB	McCullough sandy loam, 1 to 3 percent slopes
MdA	McCullough Variant very fine sandy loam, 0 to 1 percent slopes
MEA	Mead silty clay loam, 0 to 1 percent slopes
MJA	Mimbres-Jal association, nearly level
MPA	Mimbres-Prelo association, nearly level
MTA	Mimbres-Tome association, nearly level
MXC	Monticeto loam, 0 to 10 percent slopes

SYMBOL	NAME
NaC	Nickel-Aztec gravelly sandy loams, 2 to 8 percent slopes
NTD	Nickel-Tencee association, strongly sloping
OPB	Onite-Pintura association, gently sloping
PAE	Pena-Aztec Variant association, strongly sloping
PCB	Pena-Cale-Kerrick association, nearly level
PDF	Pena Variant Rock outcrop association, steep
PEC	Philder very fine sandy loam, 0 to 9 percent slopes
PFB	Philder-Armesa association, undulating
PGB	Pintura-Dona Ana complex, 0 to 5 percent slopes
PHB	Pintura-Tome-Dona Ana complex, 0 to 5 percent slopes
PkA	Prelo sandy loam, hummocky, 0 to 1 percent slopes
PlA	Prelo fine sandy loam, 0 to 1 percent slopes
PmA	Prelo silt loam, 0 to 1 percent slopes
PmB	Prelo silt loam, 1 to 3 percent slopes
PmB2	Prelo silt loam, 1 to 3 percent slopes, eroded
PnA	Prelo silt loam, hummocky, 0 to 1 percent slopes
POB	Prelo silt loam, 0 to 3 percent slopes
PpA	Prelo silt loam, frequent overflow, 0 to 1 percent slopes
PvB	Prelo-Prelo Variant complex, 0 to 3 percent slopes
RAB	Reakor-Tome-Tencee association, gently sloping
RbA	Reeves very fine sandy loam, 0 to 1 percent slopes
RcB2	Reeves very fine sandy loam, 0 to 2 percent slopes, eroded
RdA	Reeves very fine sandy loam, frequent overflow, 0 to 1 percent slopes
REB	Reeves Variant Shanta association, gently sloping
RFA	Reyab-Armesa association, gently sloping
ROG	Rock outcrop, 20 to 65 percent slopes
RPG	Rock outcrop-Deama complex, 40 to 150 percent slopes
RRF	Rock outcrop-Lozier complex, 20 to 65 percent slopes
RTE	Rock outcrop-Tortugas-Ustifluvents complex, 0 to 80 percent slopes
RUA	Ruidoso association, nearly level
SGA	Shanta-Gabaldon association, nearly level
TAC	Tencee very gravelly silt loam, 0 to 10 percent slopes
TbA	Tobler silt loam, 0 to 1 percent slopes
TcA	Tome very fine sandy loam, 0 to 1 percent slopes
TcB2	Tome very fine sandy loam, 1 to 3 percent slopes, eroded
TDB	Tome silt loam, frequent overflow, 0 to 5 percent slopes
TeB	Tome silt loam, frequent overflow, 1 to 3 percent slopes
TfB	Tome-Emot complex, 0 to 3 percent slopes
TOE	Tortugas cobbly loam, 5 to 30 percent slopes
TPE	Tortugas-Deama association, moderately steep
TPG	Tortugas-Deama association, very steep
TvA	Torrifluvents, hummocky, 0 to 1 percent slopes
UaA	Ustic Torriorthents, frequent overflow, 0 to 1 percent slopes

1

N

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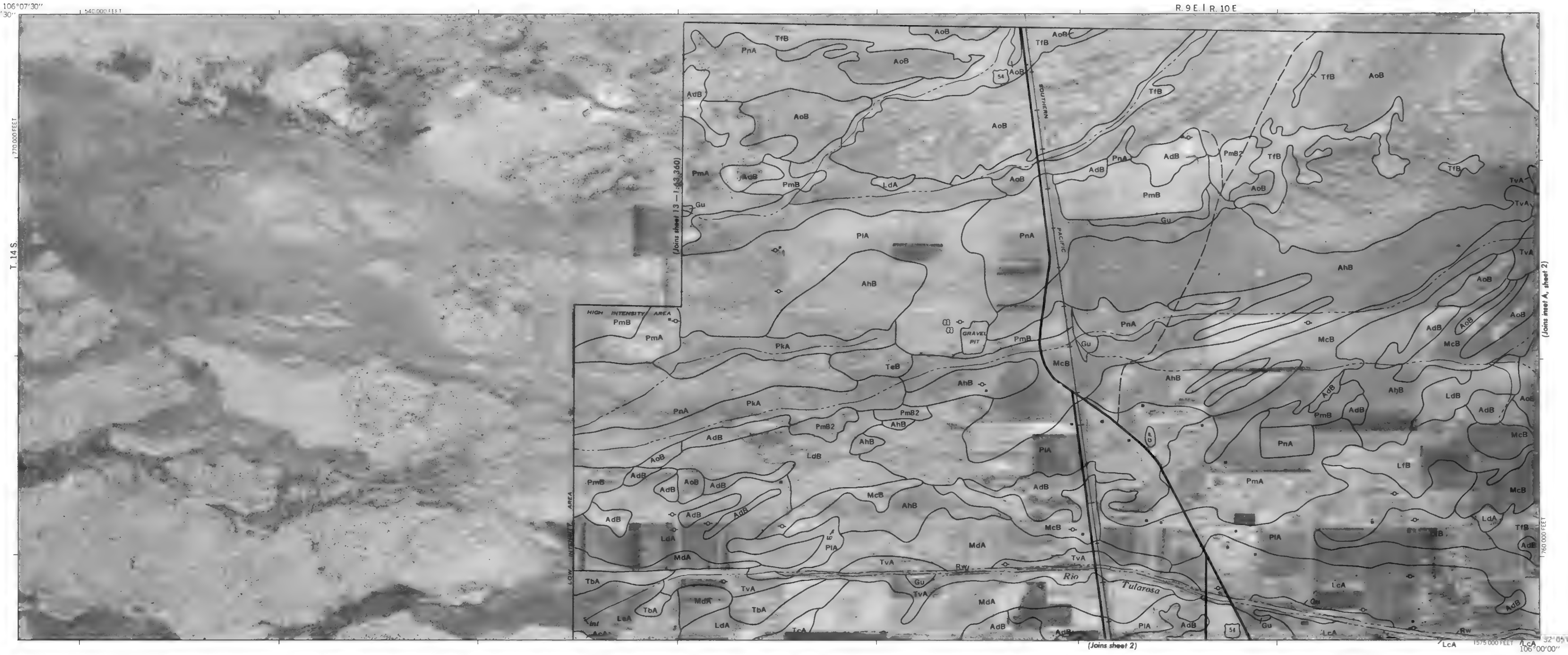
Coordinate grid ticks and land division corners, if shown, are approximately positioned

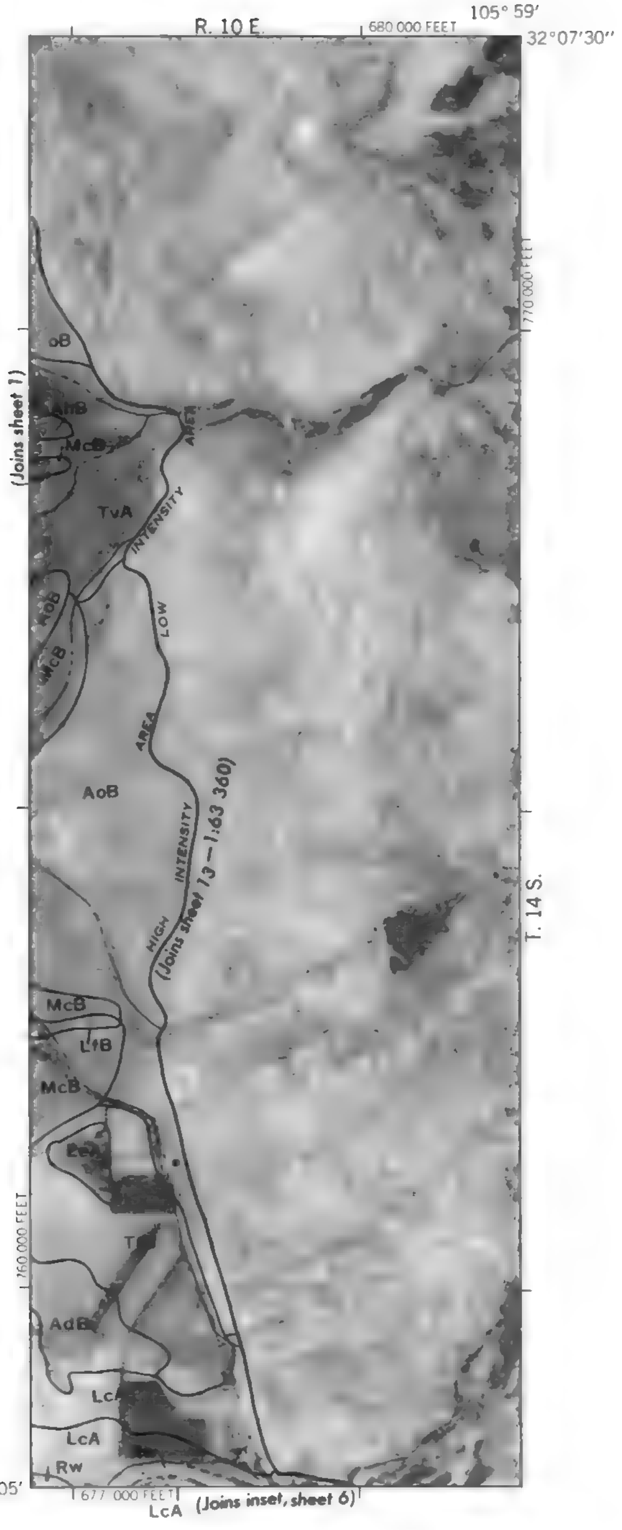


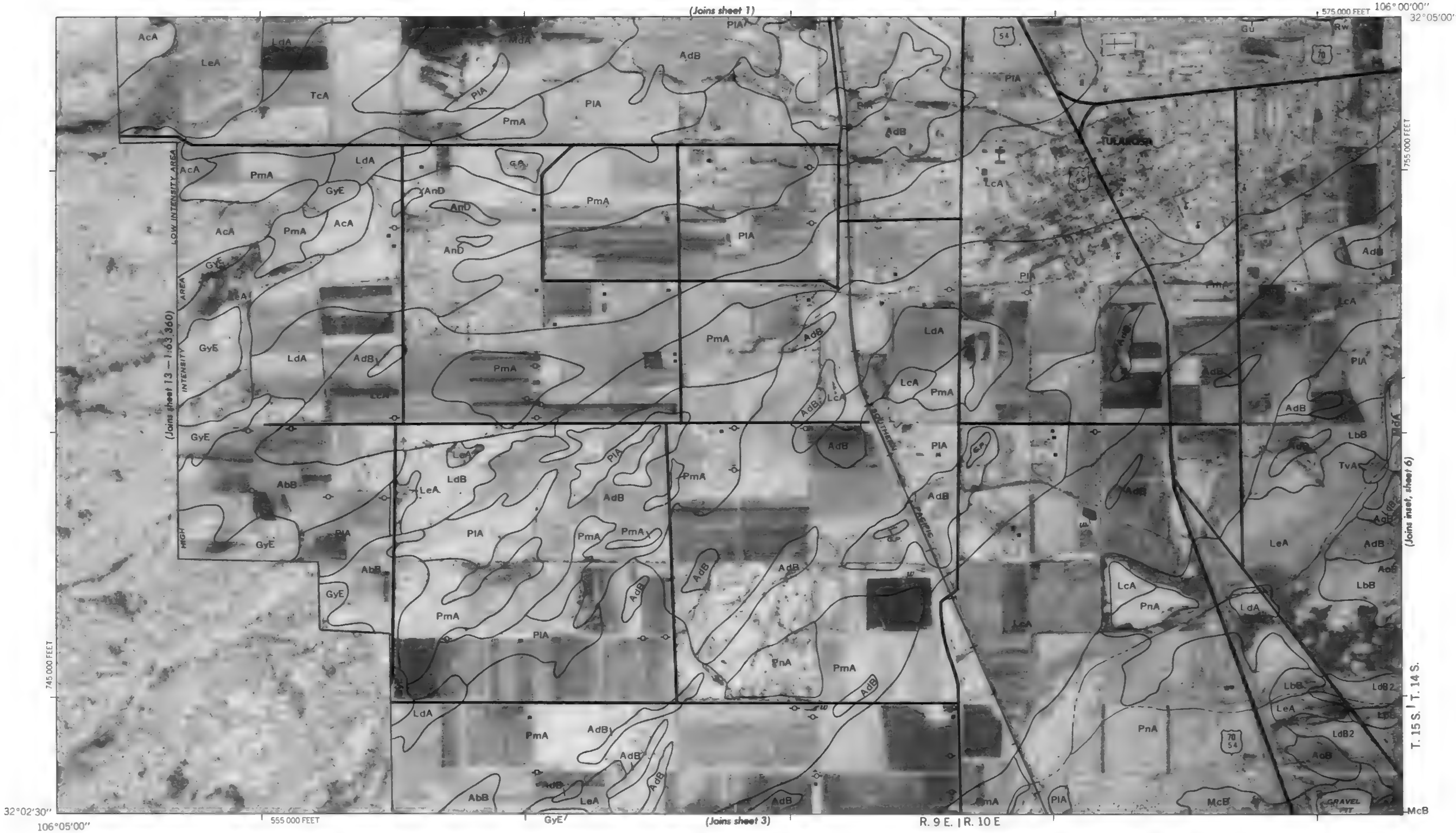
1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

SOIL SURVEY OF OTERO AREA, NEW MEXICO, PARTS OF OTERO, EDDY, AND CHAVES COUNTIES — SHEET NUMBER 2





Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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3

N

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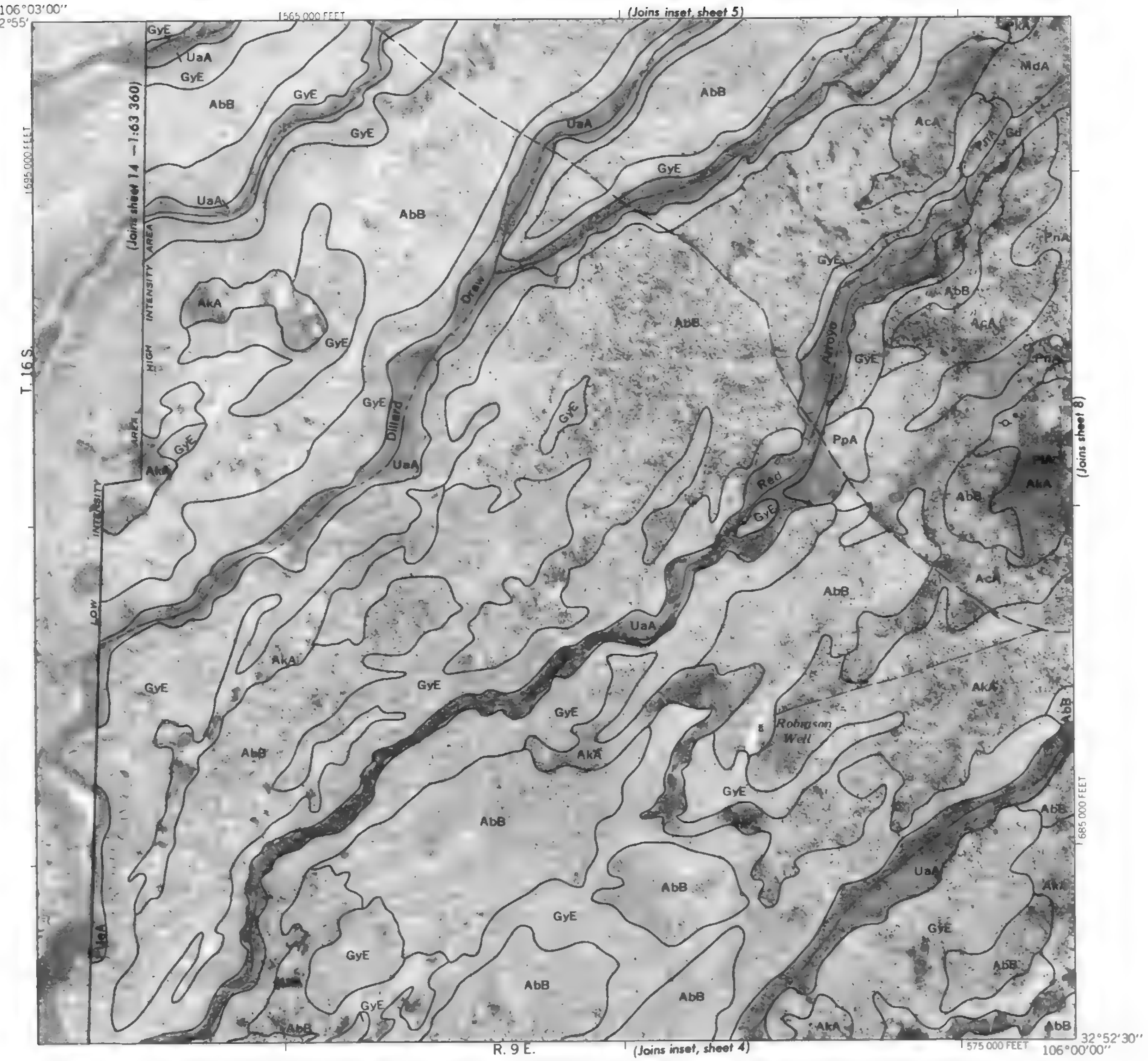
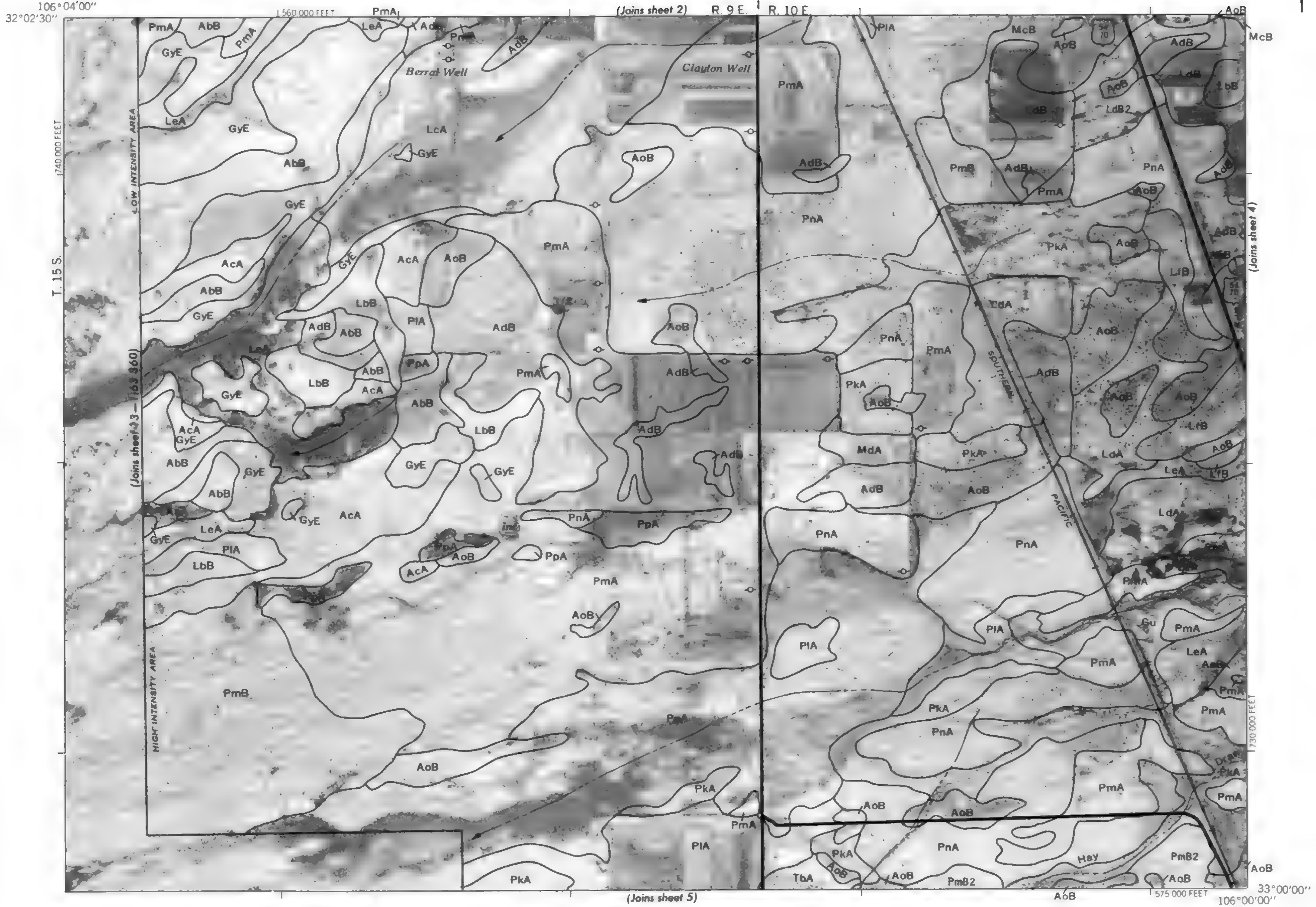




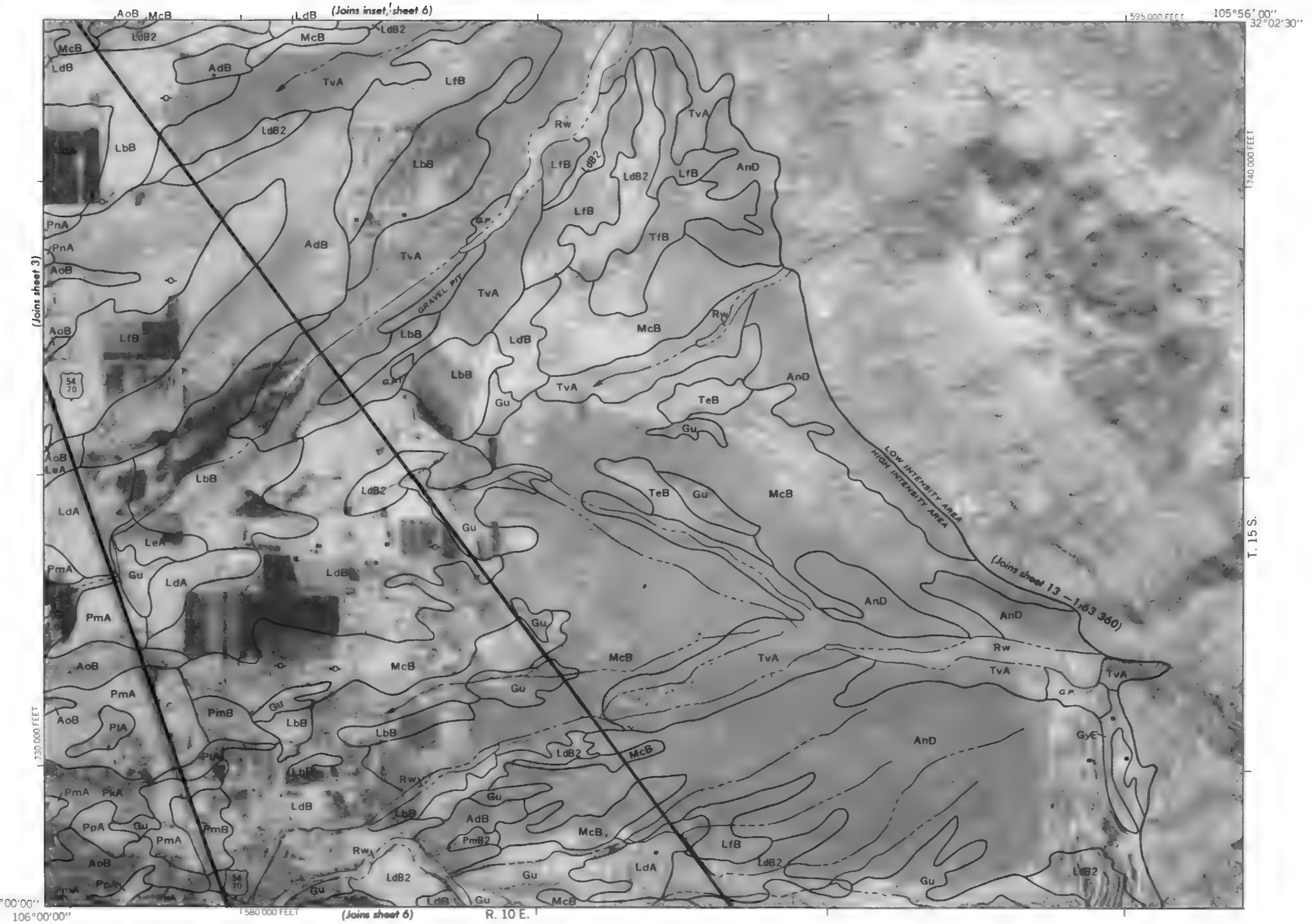
1 ¾ ½ ¼ 0 1 2 Miles

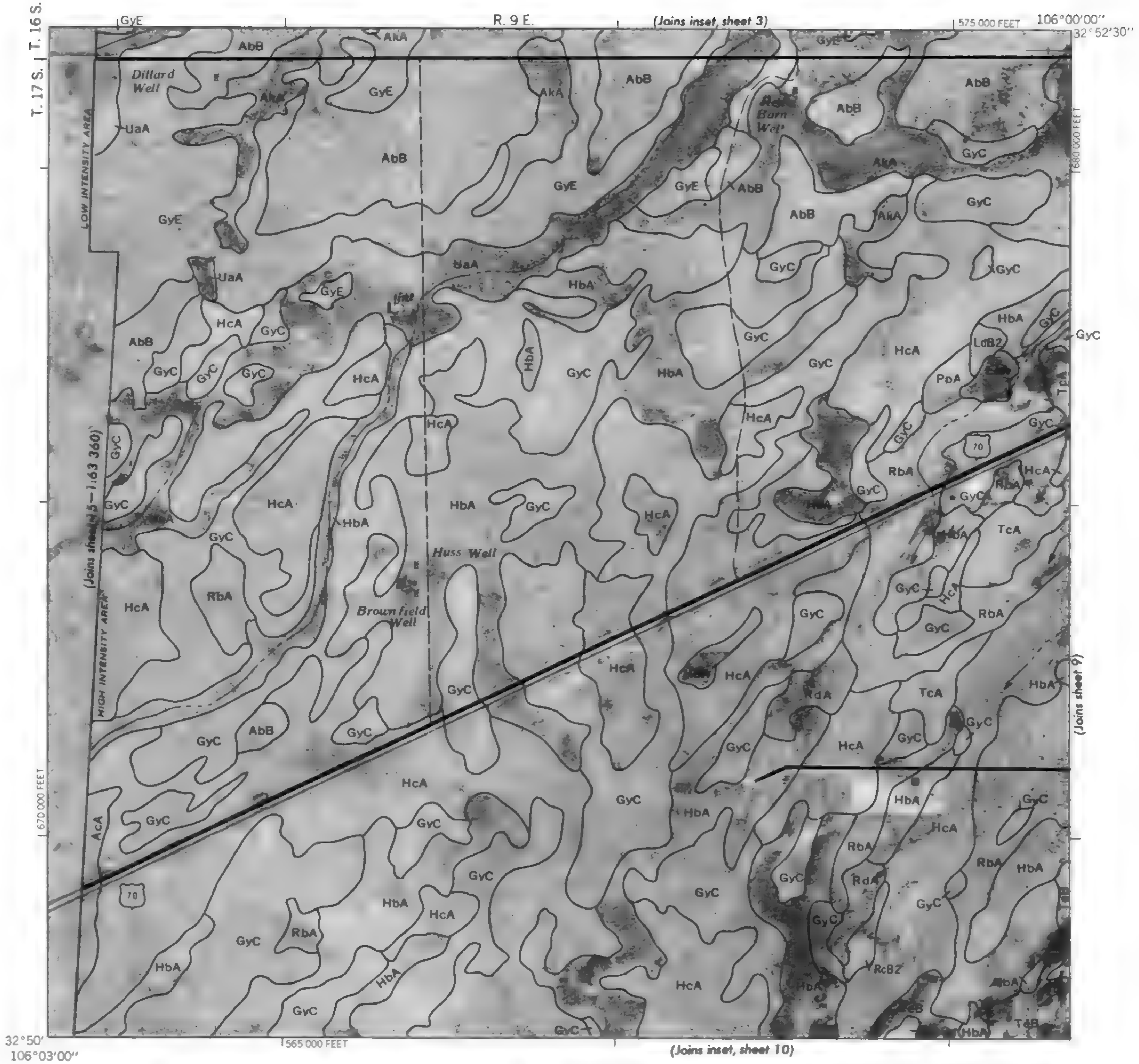
5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

N

SOIL SURVEY OF OTERO AREA, NEW MEXICO, PARTS OF OTERO, EDDY, AND CHAVES COUNTIES — SHEET NUMBER 4





1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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N

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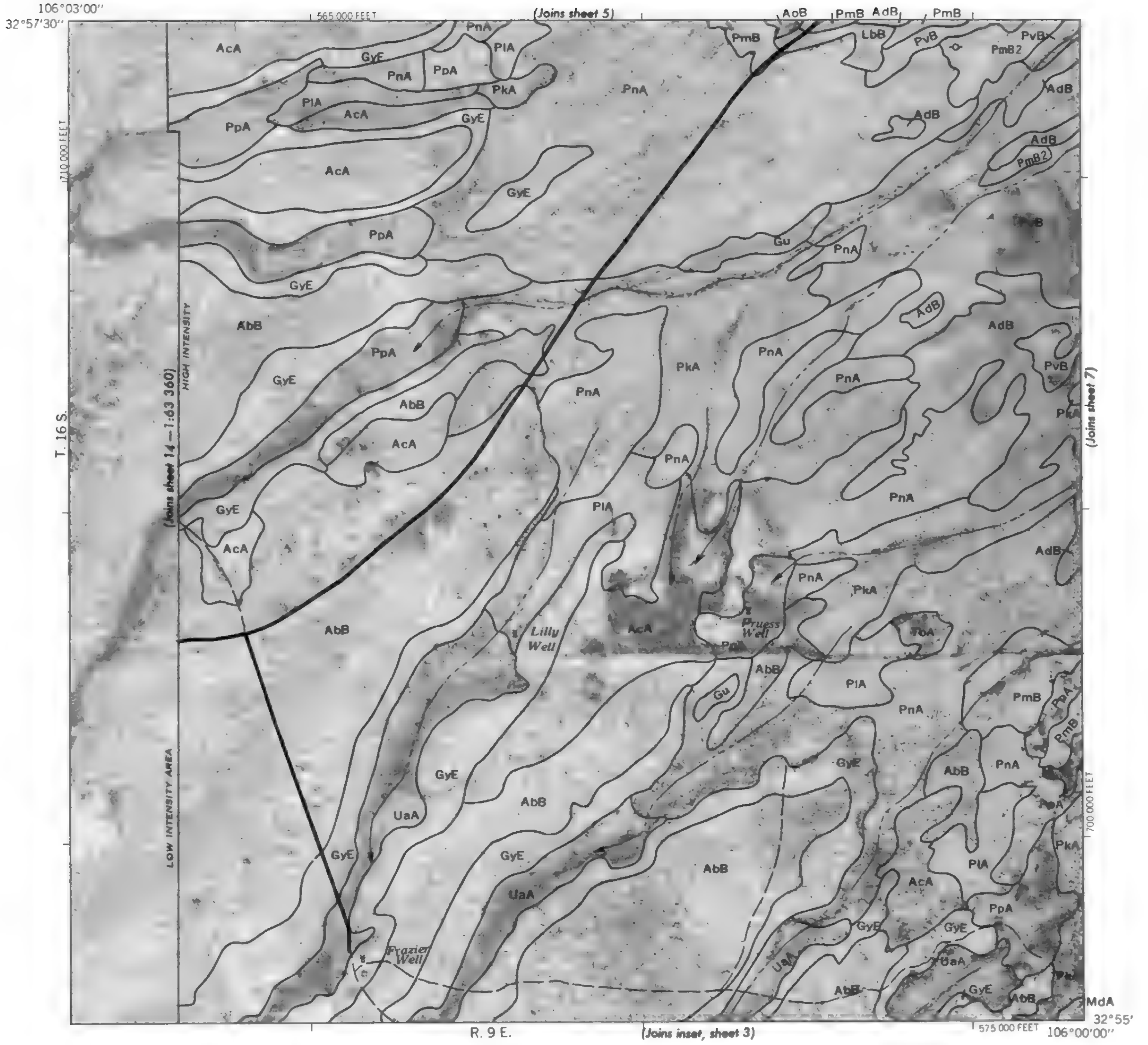
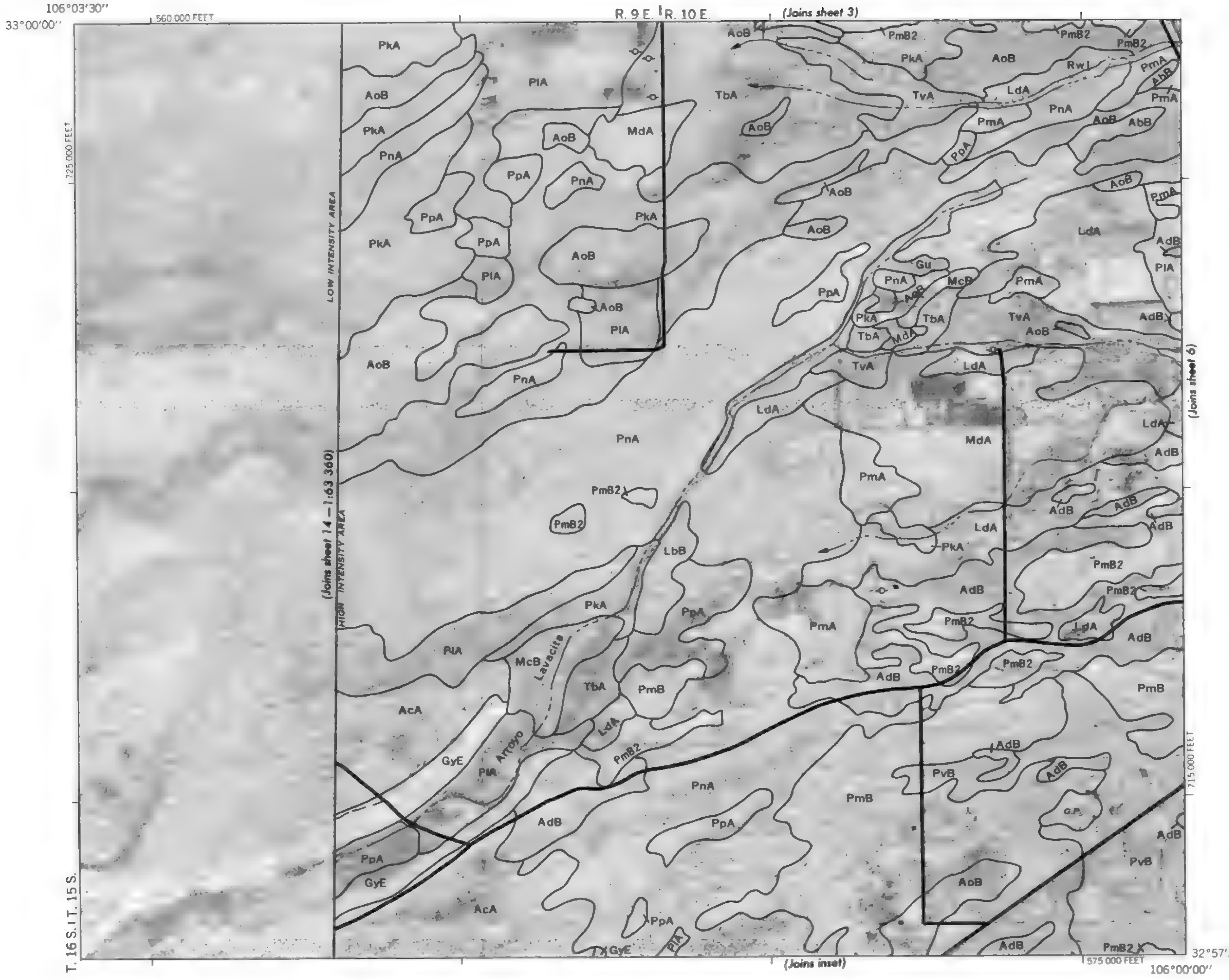
INSET





1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

N

SOIL SURVEY OF OTERO AREA, NEW MEXICO, PARTS OF OTERO, EDDY, AND CHAVES COUNTIES — SHEET NUMBER 6

Scale 1:24 000

1 ¾ ½ ¼ 0 1 2 Miles

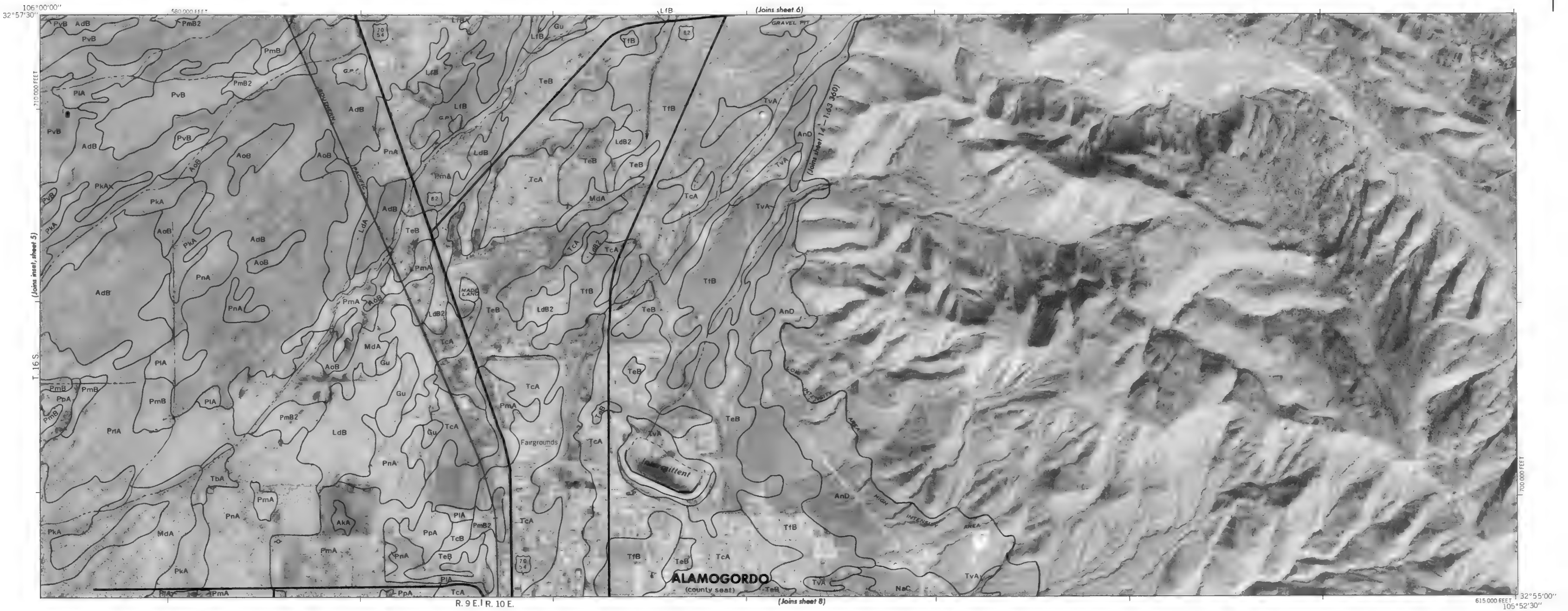
5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Coordinate grid ticks and land division corners, if shown, are approximately positioned.

Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974, 1975, and 1977 aerial photography

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies

7



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
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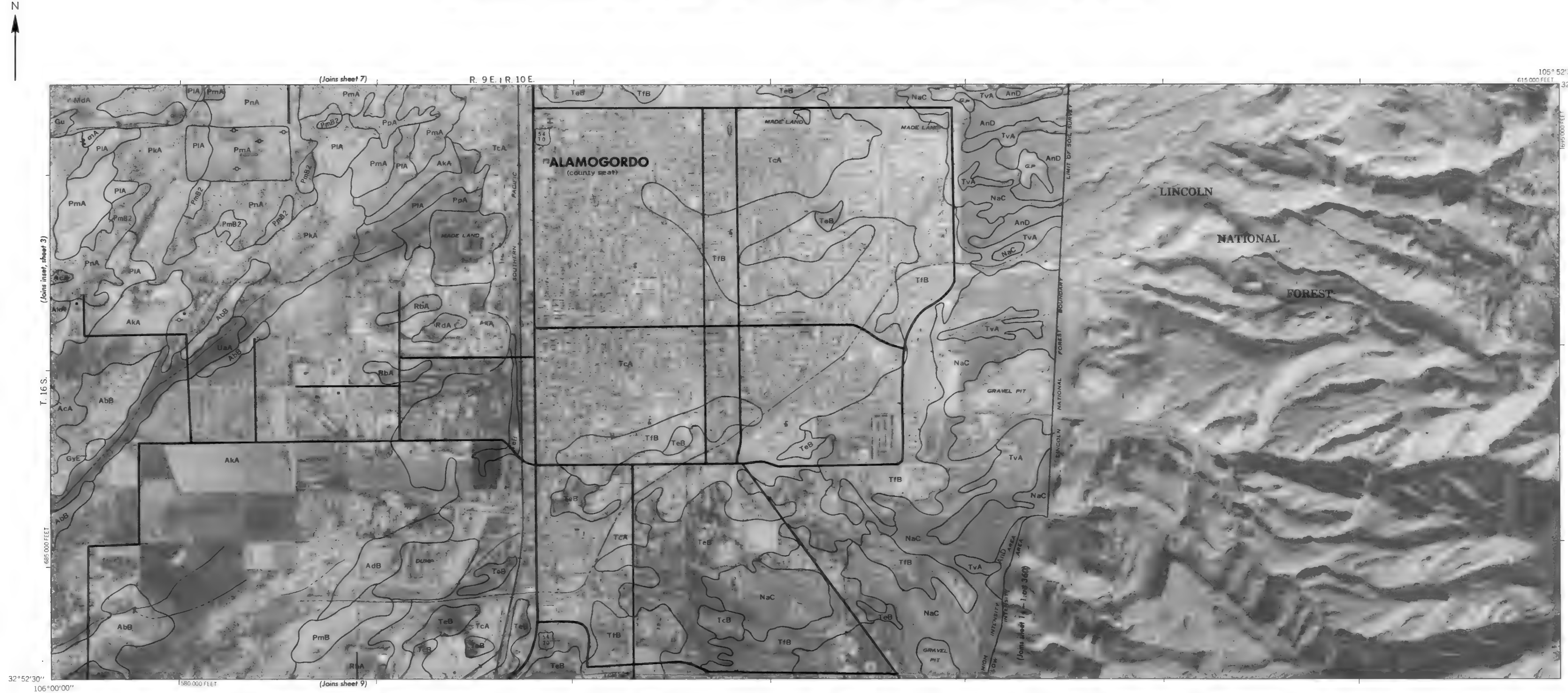
Coordinate grid ticks and land division corners if shown, are approximately positioned

1 ¾ ½ ¼ 0 1 2 Miles
5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

SOIL SURVEY OF OTERO AREA, NEW MEXICO, PARTS OF OTERO, EDDY, AND CHAVES COUNTIES — SHEET NUMBER 8



1 ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

Coordinate grid ticks and land division corners, if shown, are approximately positioned

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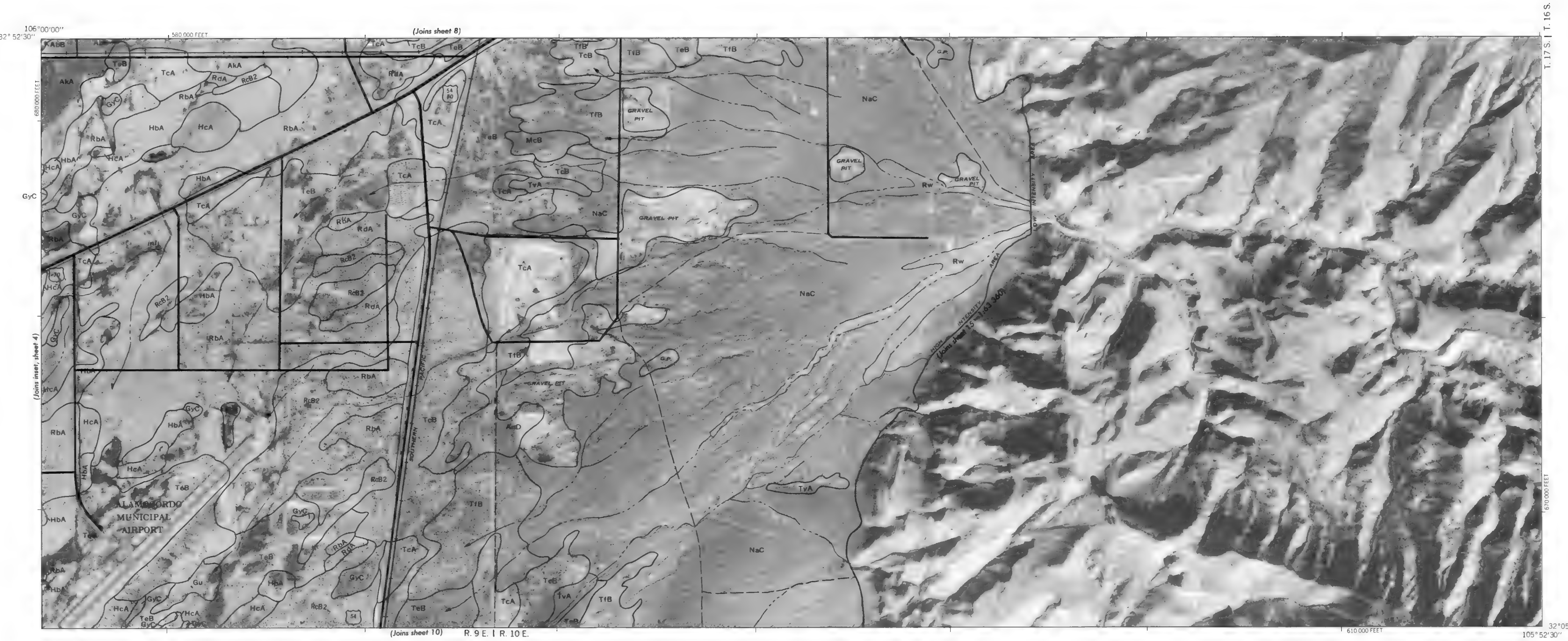
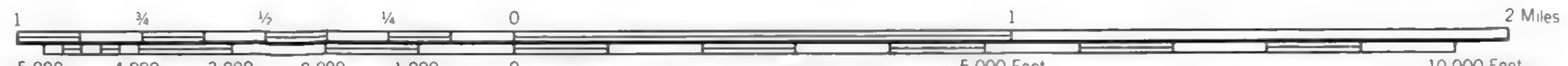


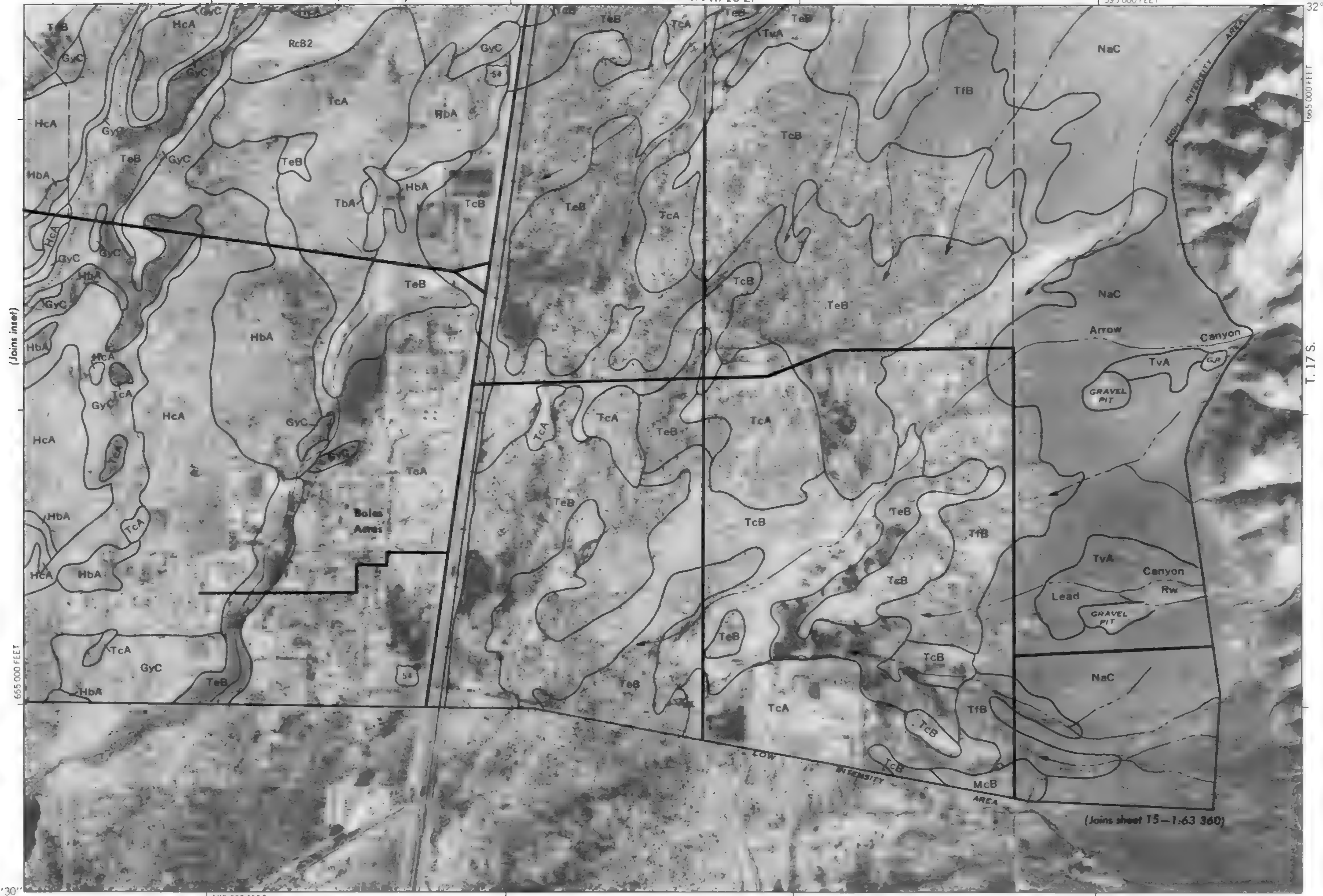


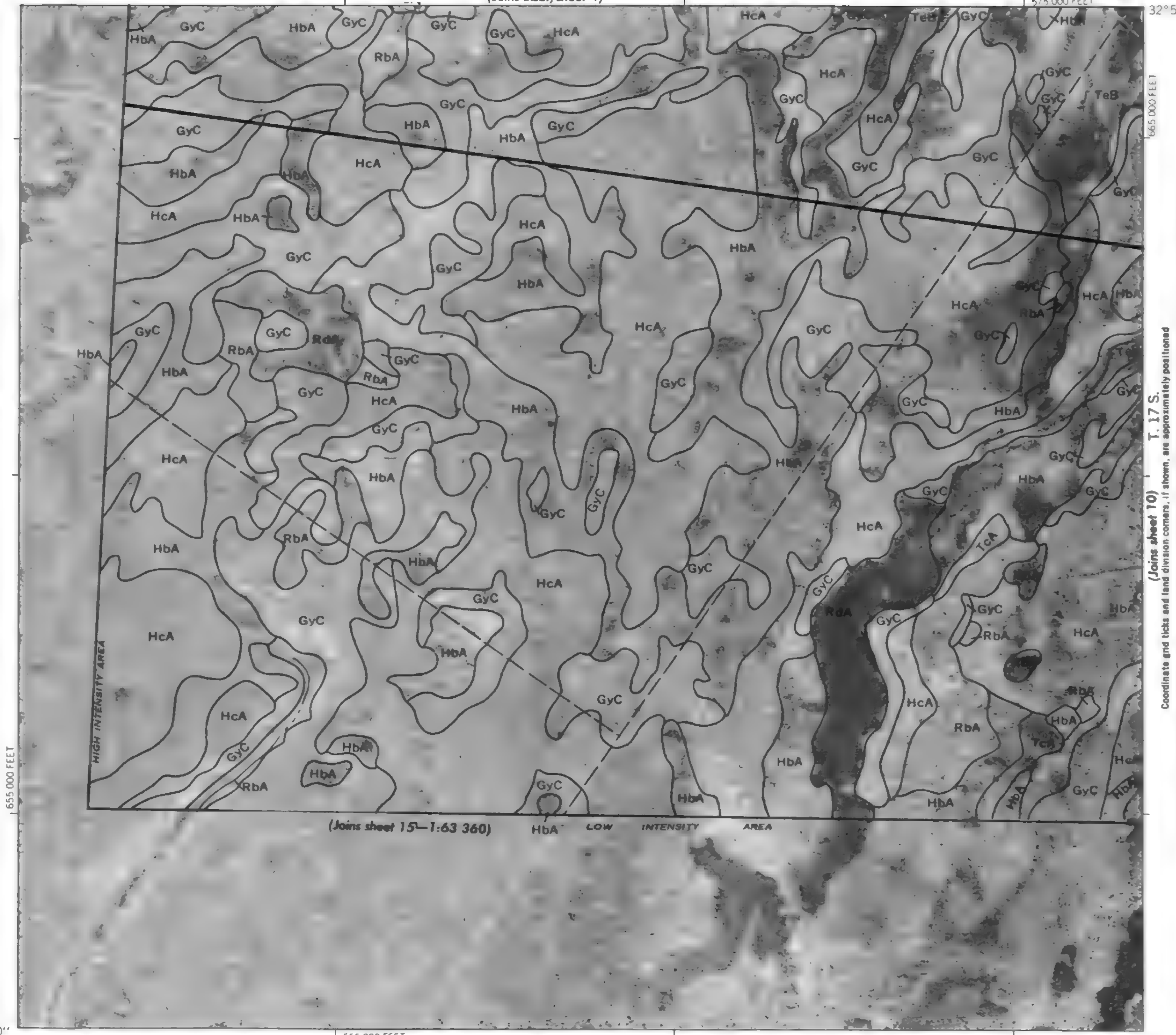
Scale 1:24 000

10

N

SOIL SURVEY OF OTERO AREA, NEW MEXICO, PARTS OF OTERO, EDDY, AND CHAVES COUNTIES — SHEET NUMBER 10





Coordinate grid ticks and land division corners, if shown, are approximately positioned.
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1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 Feet 10 000 Feet

Scale 1:24 000

11

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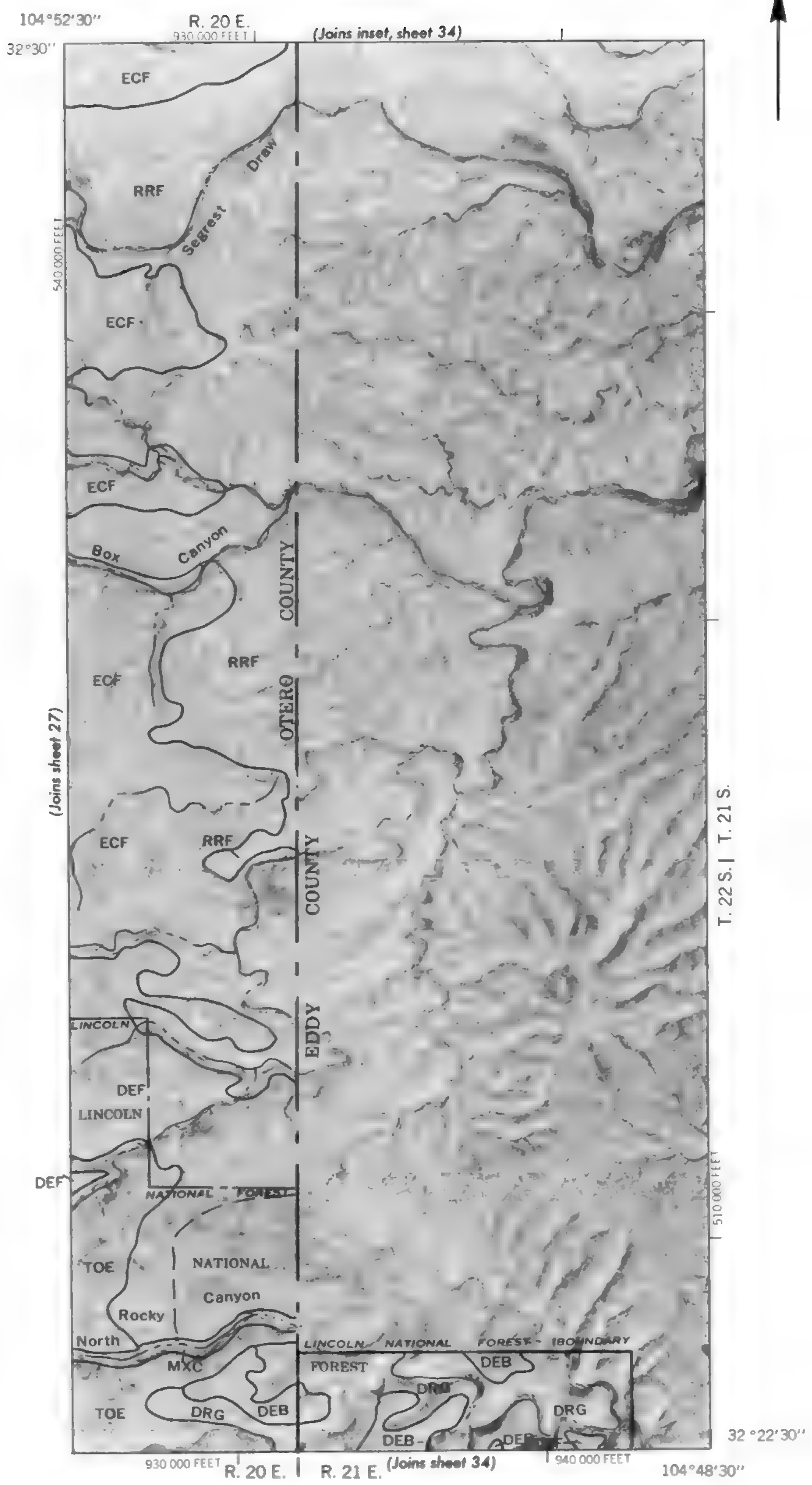
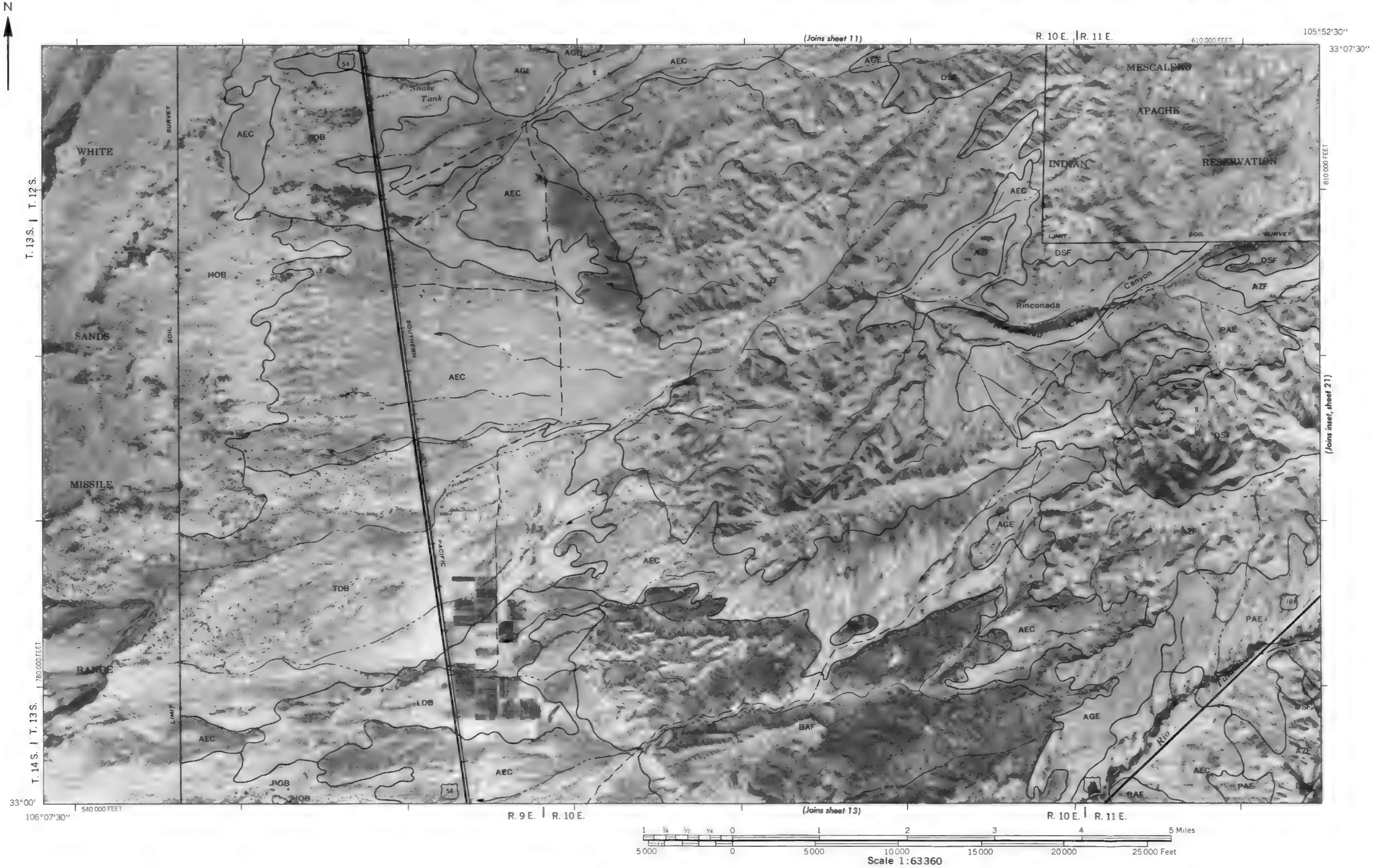


1 ¾ ½ ¼ 0 1 2 3 4 5 Miles

5000 0 5000 10000 15000 20000 25000 Feet

Scale 1:63 360

SOIL SURVEY OF OTERO AREA, NEW MEXICO, PARTS OF OTERO, EDDY, AND CHAVES COUNTIES — SHEET NUMBER 12



Coordinate grid ticks and land division corners, if shown, are approximately positioned

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SOIL SURVEY OF OTERO AREA, NEW MEXICO, PARTS OF OTERO, EDDY, AND CHAVES COUNTIES — SHEET NUMBER 13

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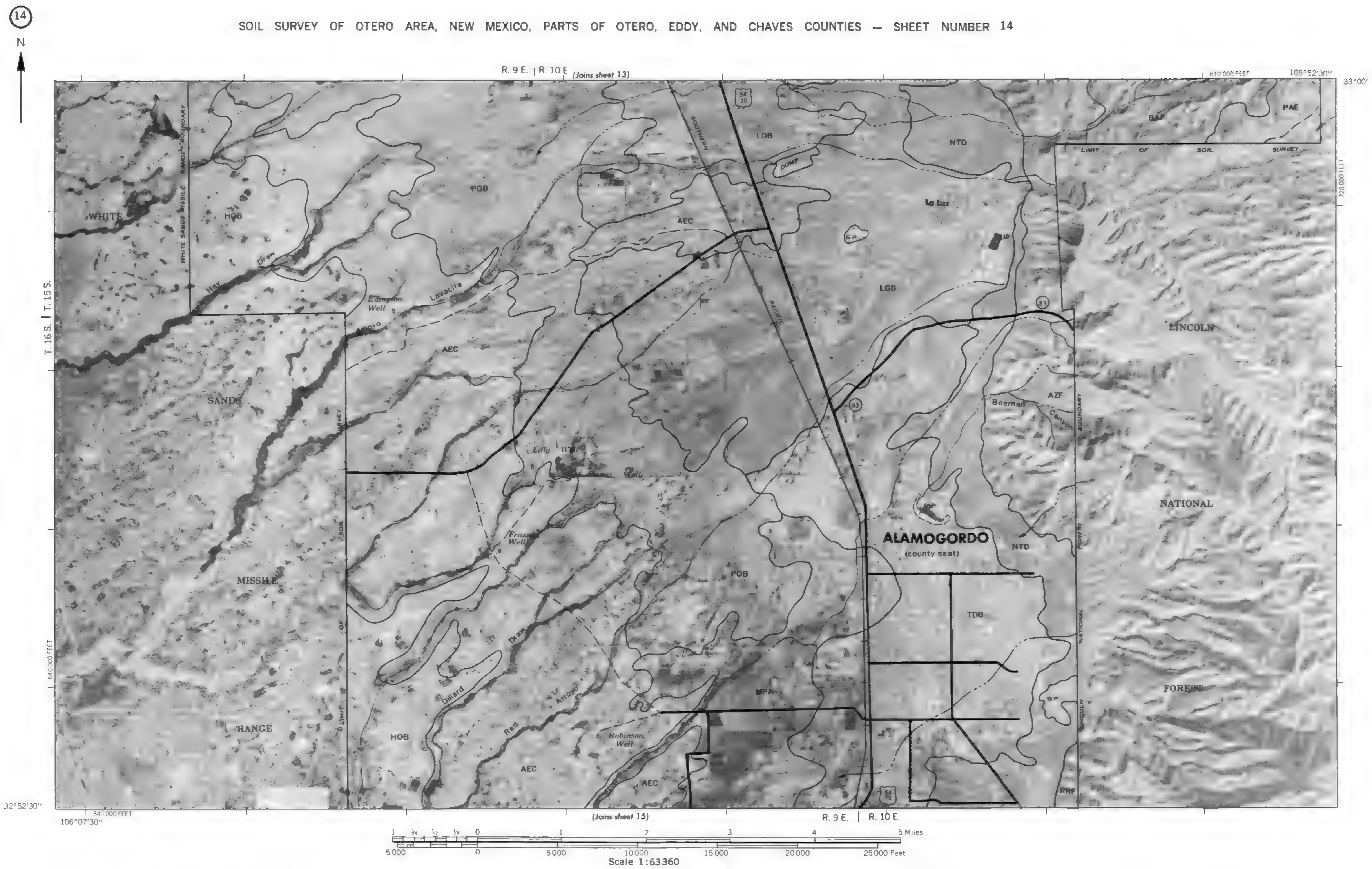
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 ¾ ½ ¼ 0 1 2 3 4 5 Miles

5 000 0 5 000 10 000 15 000 20 000 25 000 Feet

Scale 1:63 360



Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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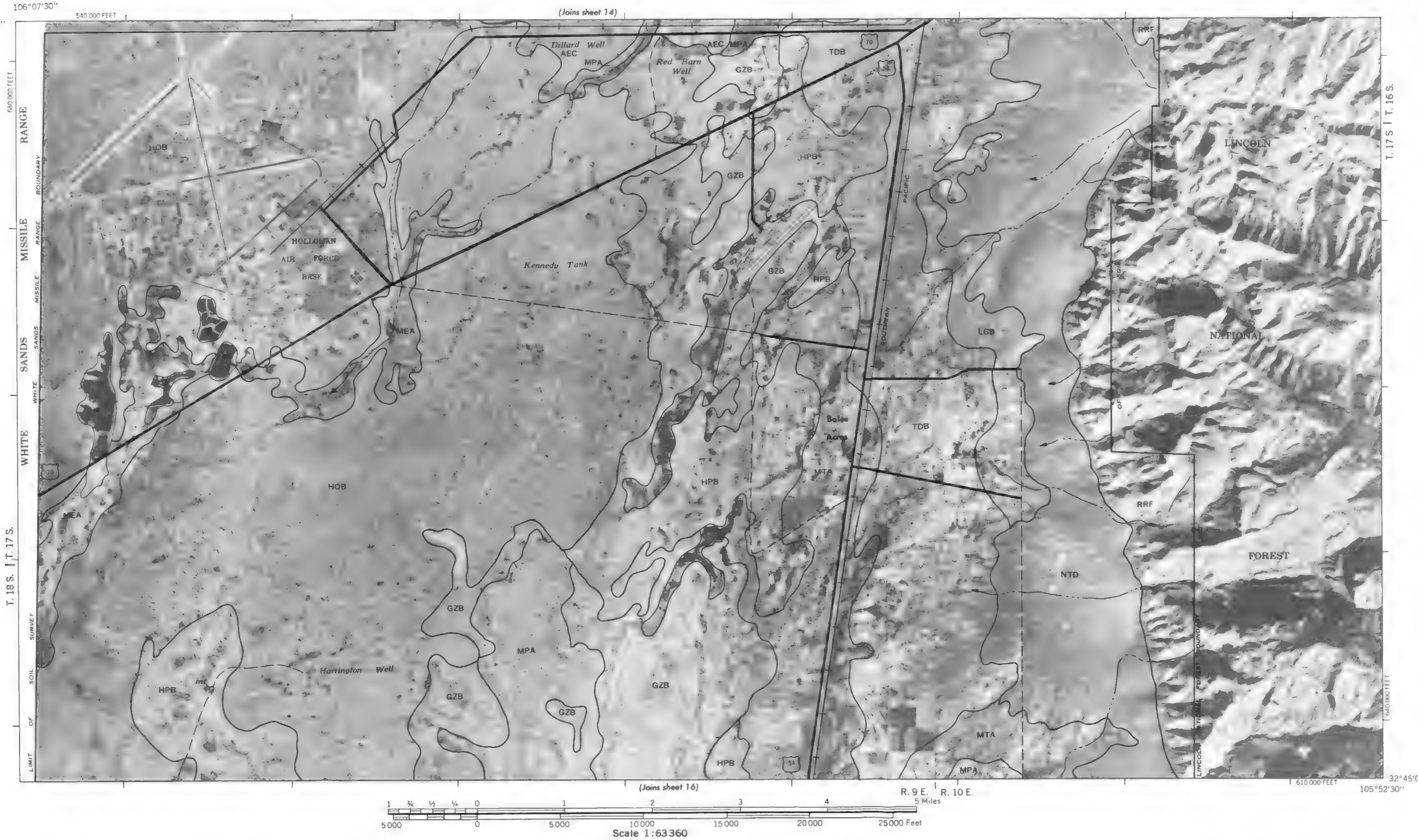

SOIL SURVEY OF OTERO AREA, NEW MEXICO, PARTS OF OTERO, EDDY, AND CHAVES COUNTIES — SHEET NUMBER 16

Coordinate grid ticks and land division corners, if shown, are approximately positioned

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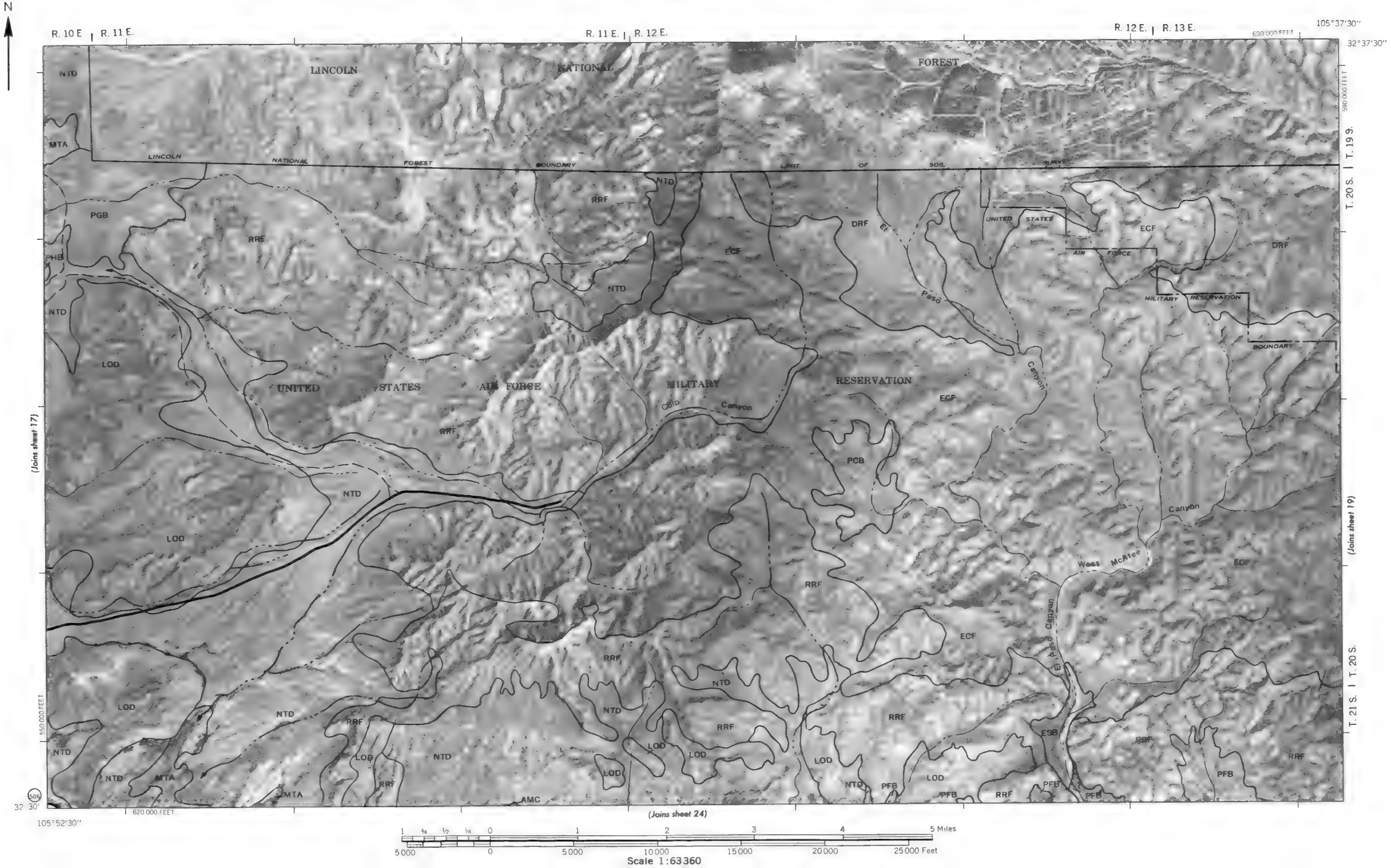
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

18

SOIL SURVEY OF OTERO AREA, NEW MEXICO, PARTS OF OTERO, EDDY, AND CHAVES COUNTIES — SHEET NUMBER 18



Coordinate grid ticks and land division corners, if shown, are approximately positioned

Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974, 1975, and 1977 aerial photography

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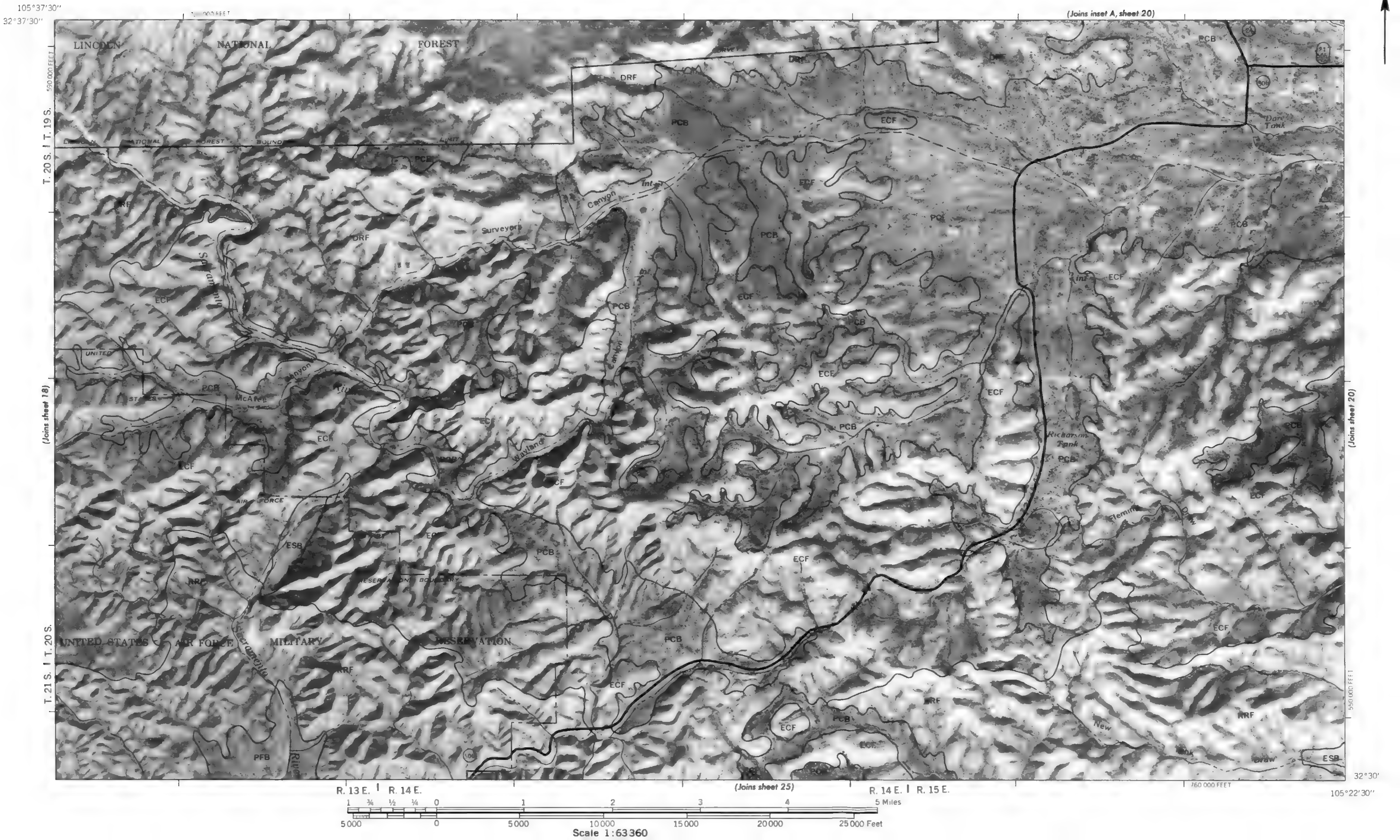

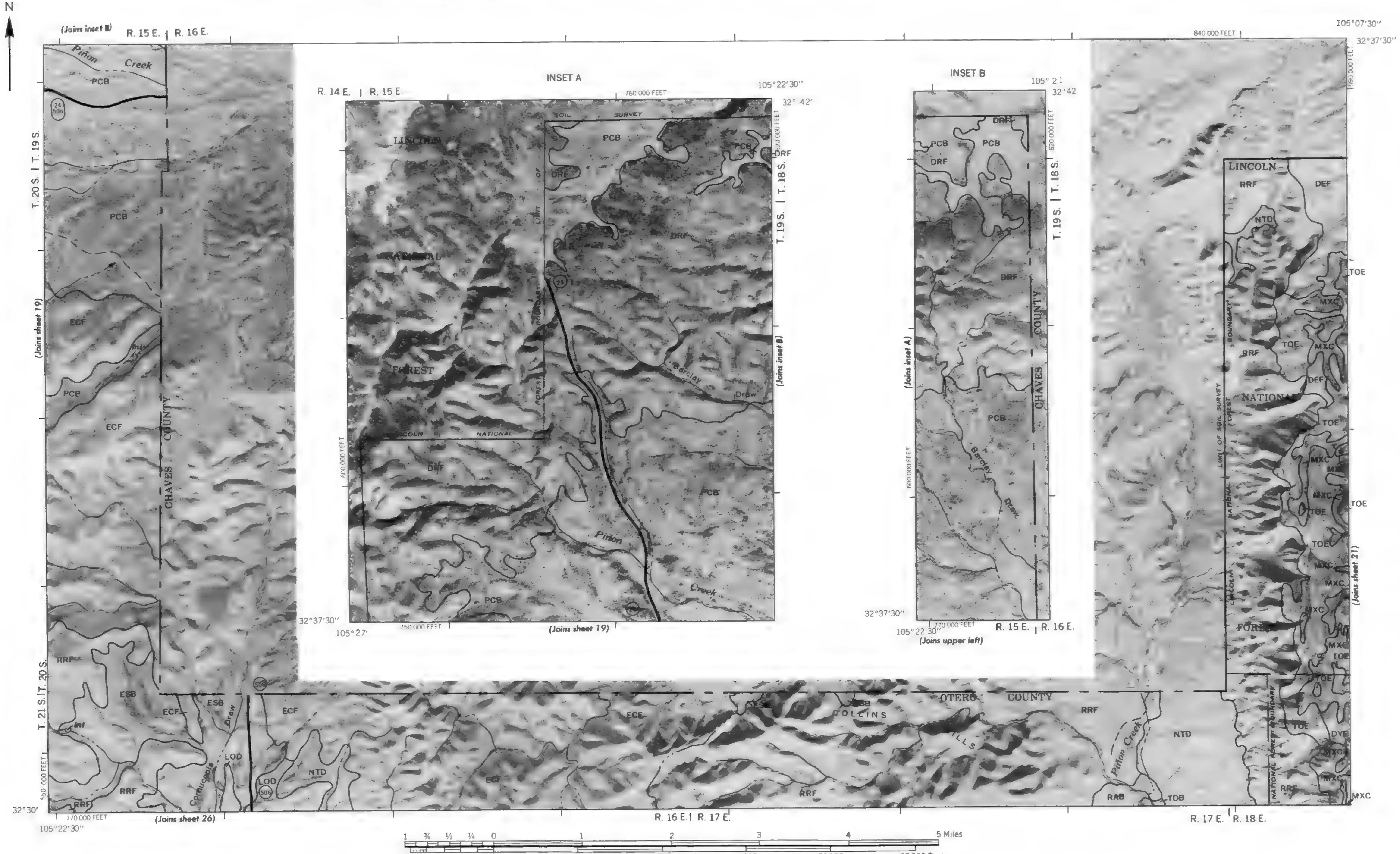

Coordinate grid ticks and land division corners, if shown, are approximately positioned

Base maps are orthophotographs prepared by the U S Department of the Interior, Geological Survey, from 1974, 1975, and 1977 aerial photography.

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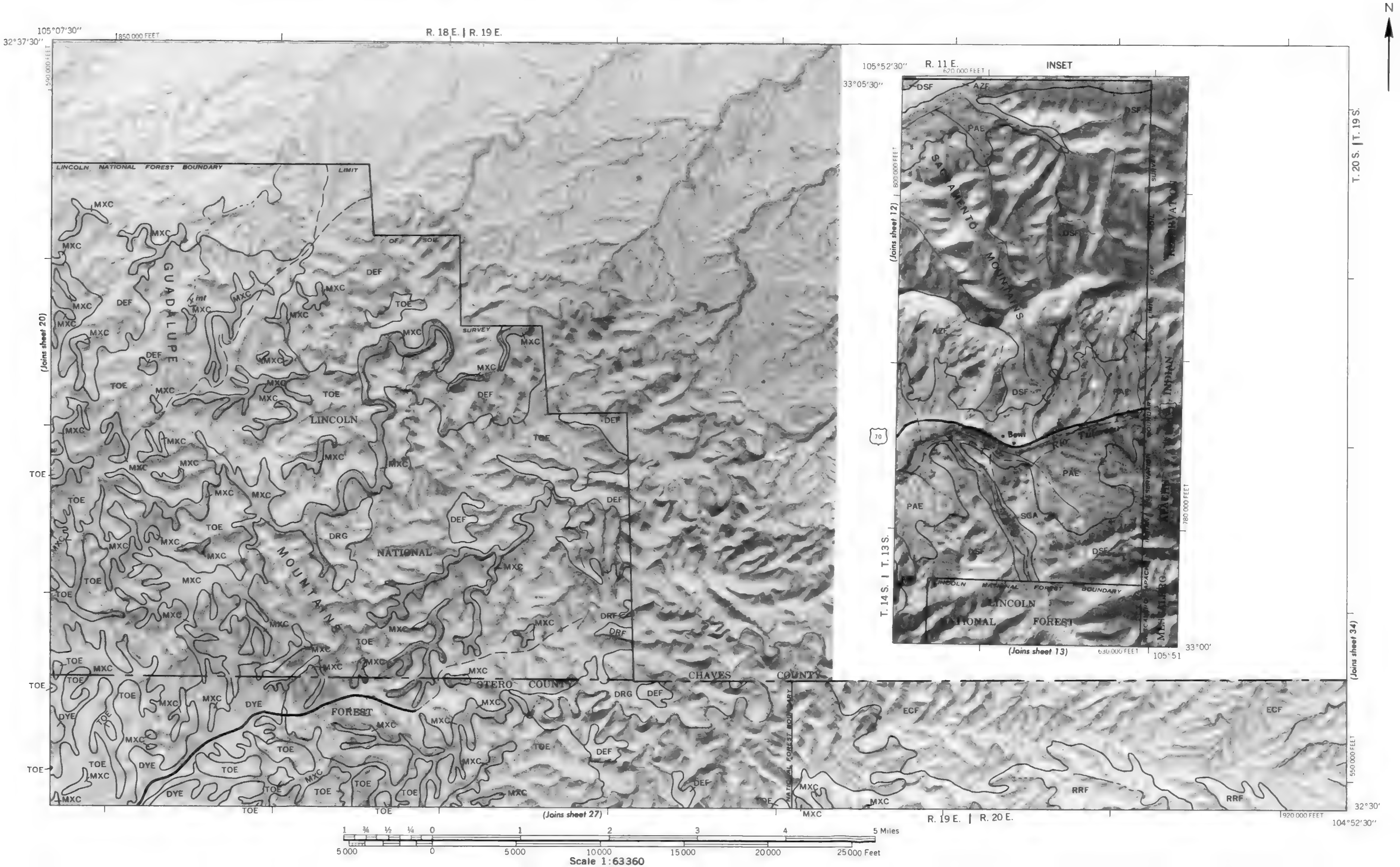

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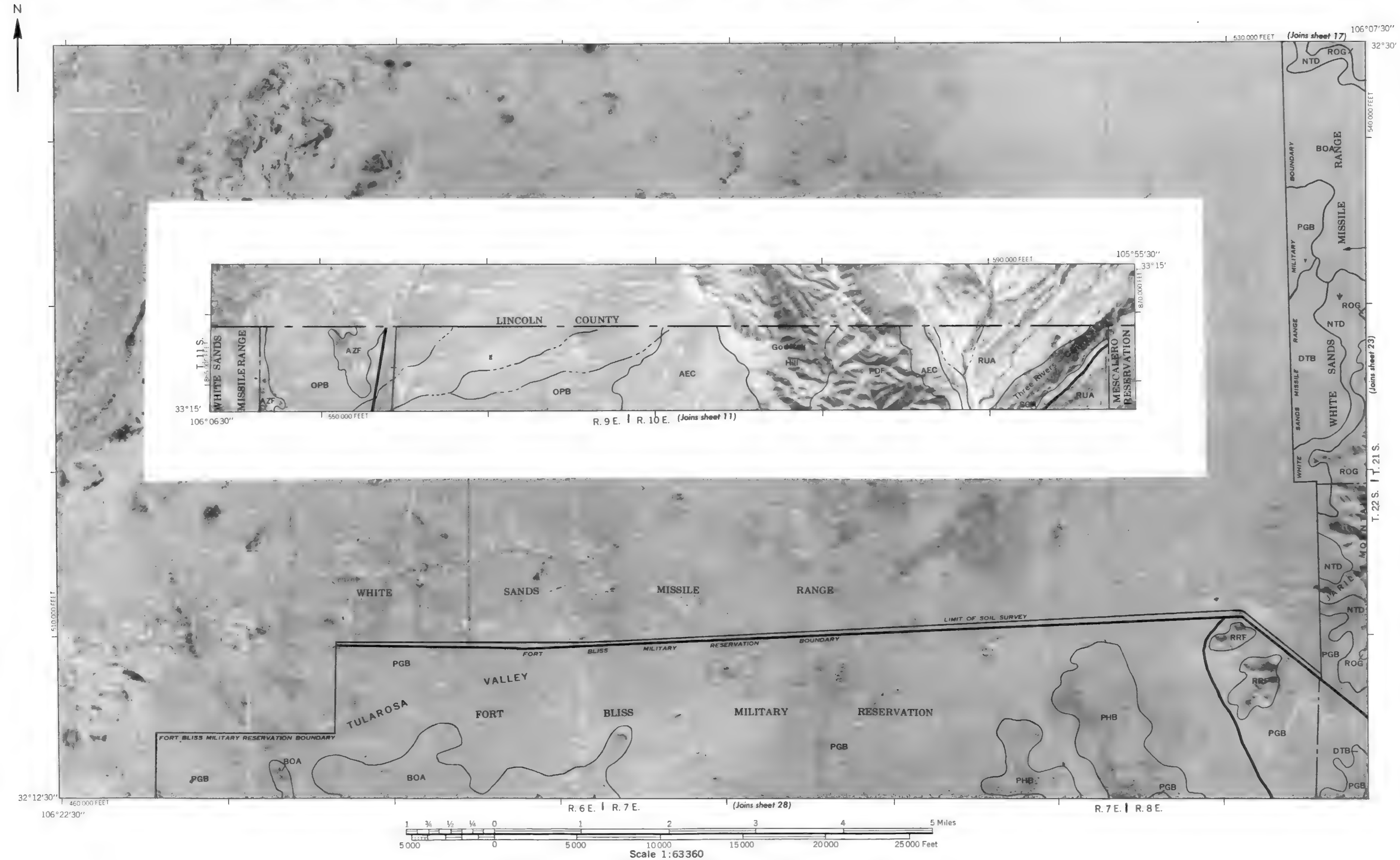
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF OTERO AREA, NEW MEXICO, PARTS OF OTERO, EDDY, AND CHAVES COUNTIES — SHEET NUMBER 22



Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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23

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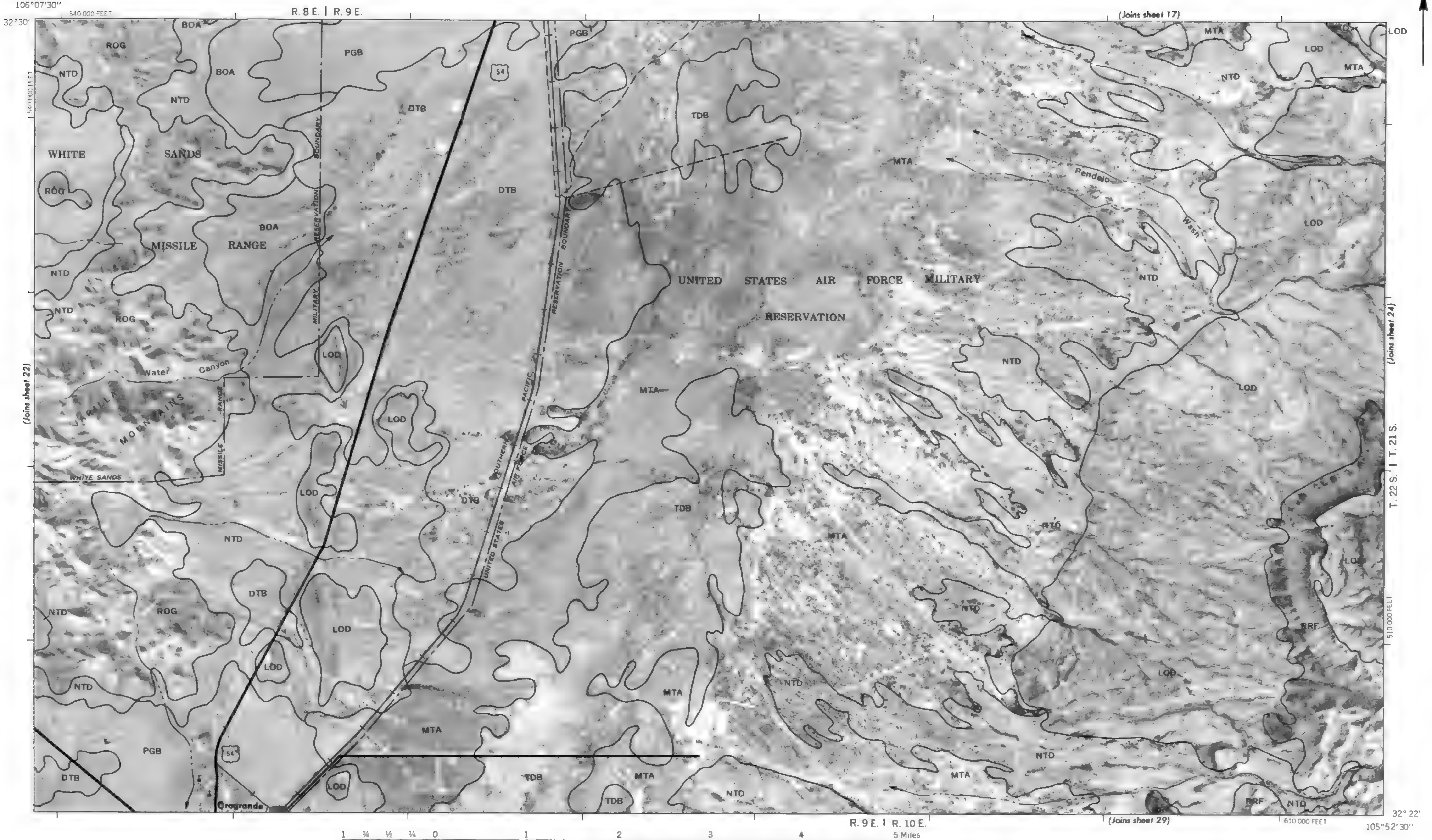
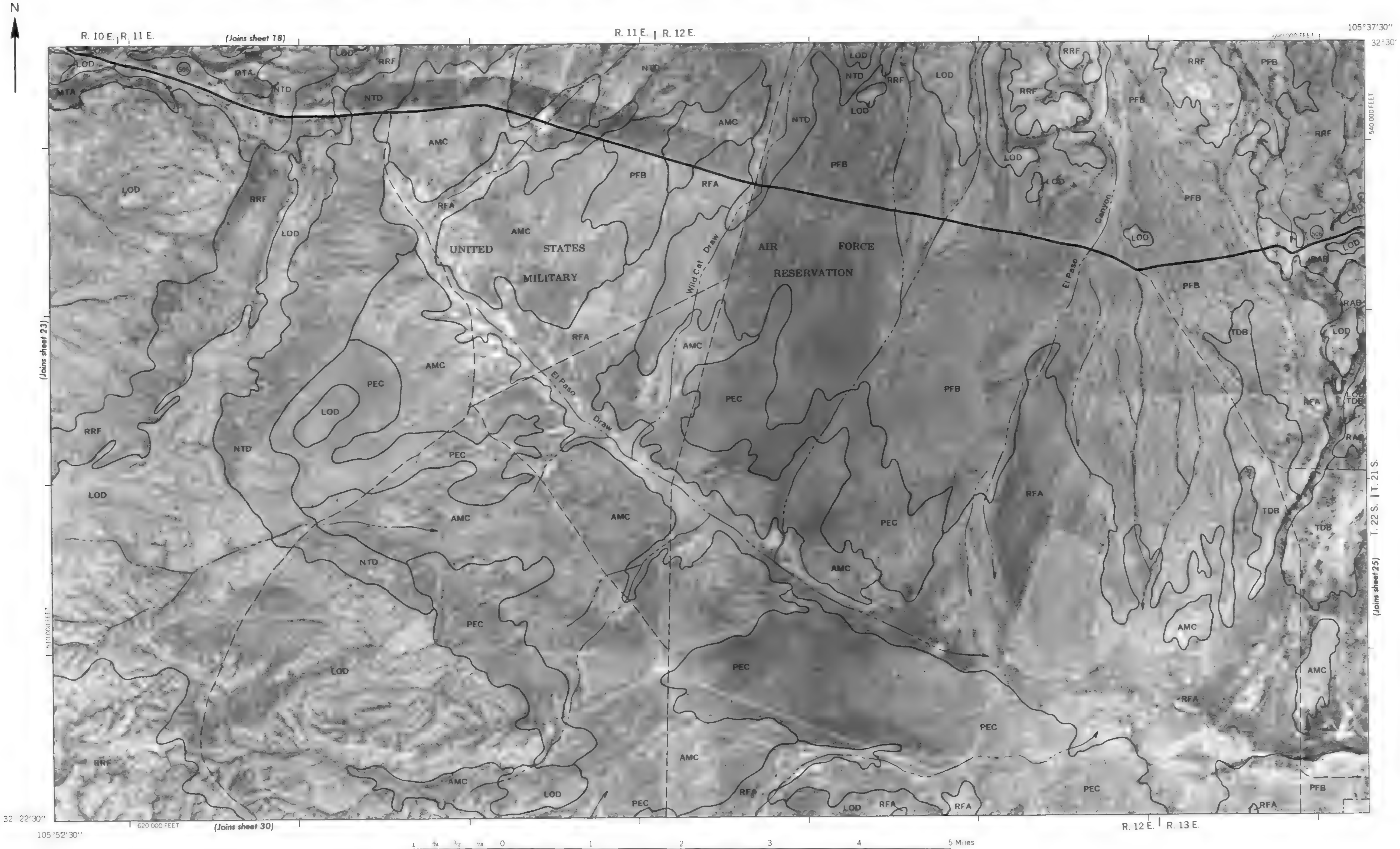


1 ¾ ½ ¼ 0 1 2 3 4 5 Miles

5000 0 5000 10000 15000 20000 25000 Feet

Scale 1:63360

SOIL SURVEY OF OTERO AREA, NEW MEXICO, PARTS OF OTERO, EDDY, AND CHAVES COUNTIES — SHEET NUMBER 24

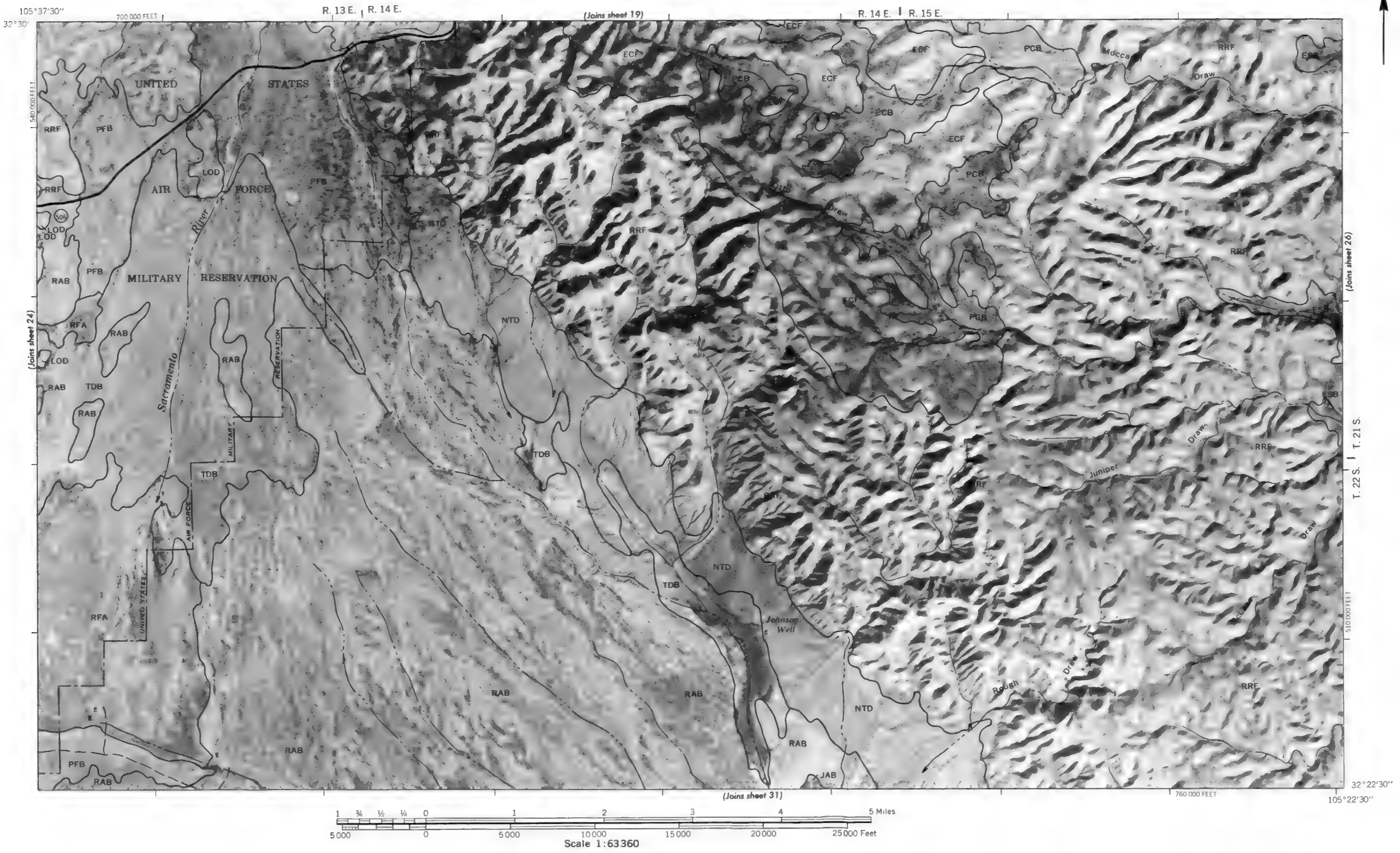


1 0 5 Miles
5000 0 5000 10000 15000 20000 25000 Feet
Scale 1:63360

Coordinate grid ticks and land division corners, if shown, are approximately positioned

Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974, 1975, and 1977 aerial photography

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies



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Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF OTERO AREA, NEW MEXICO, PARTS OF OTERO, EDDY, AND CHAVES COUNTIES — SHEET NUMBER 26

1 ¾ ½ ¼ 0 1 2 3 4 5 Miles

5000 0 5000 10000 15000 20000 25000 Feet

Scale 1:63 360

Coordinate grid ticks and land division corners, if shown, are approximately positioned.

Base maps are orthophotographs prepared by the U S Department of the Interior, Geological Survey, from 1974, 1975, and 1977 aerial photography

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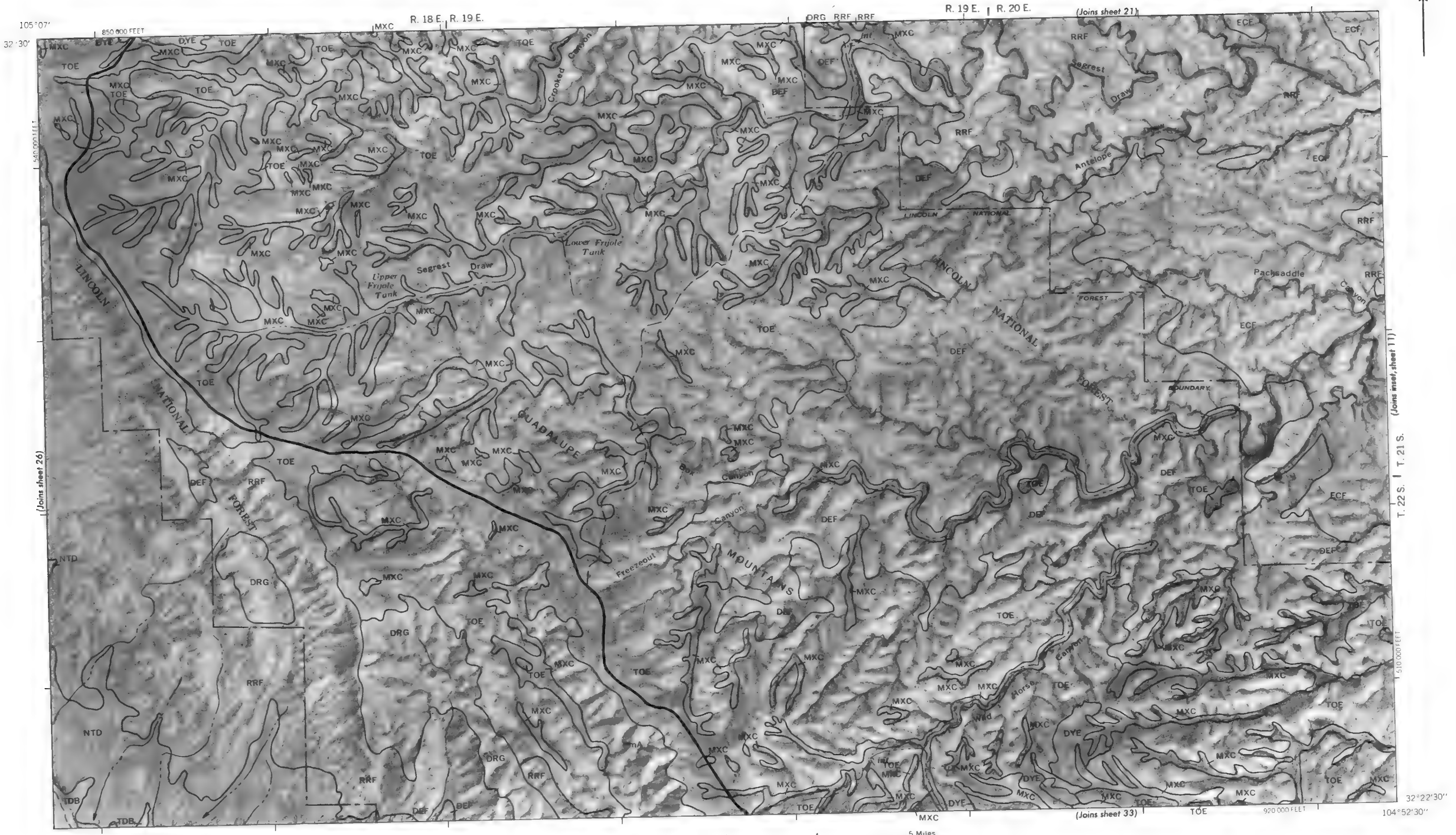
SOIL SURVEY OF OTERO AREA, NEW MEXICO, PARTS OF OTERO, EDDY, AND CHAVES COUNTIES — SHEET NUMBER 27



1 ¾ ½ ¼ 0 1 2 3 4 5 Miles

5000 0 5000 10000 15000 20000 25000 Feet

Scale 1:63360

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
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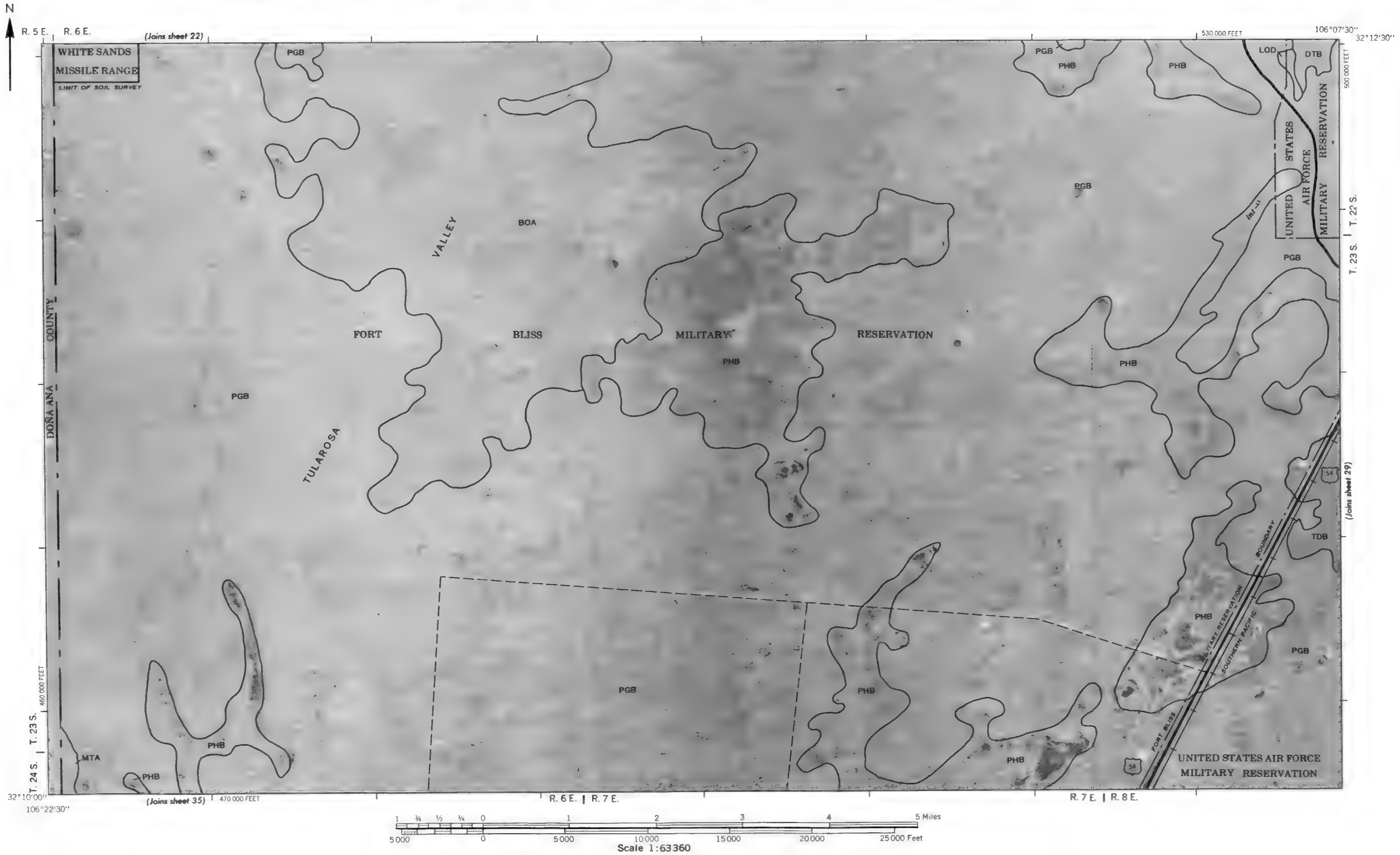
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF OTERO AREA, NEW MEXICO, PARTS OF OTERO, EDDY, AND CHAVES COUNTIES — SHEET NUMBER 28



Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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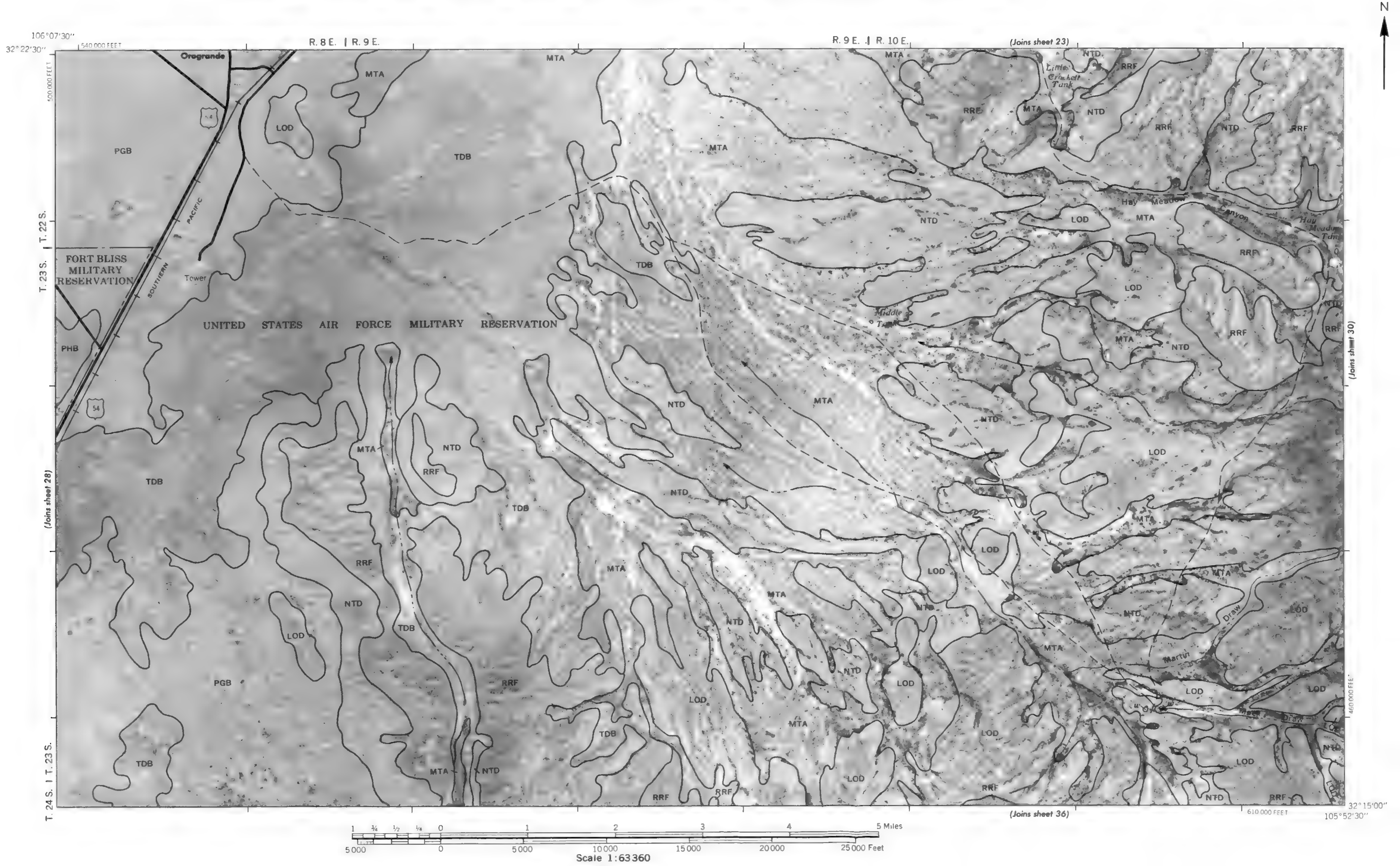

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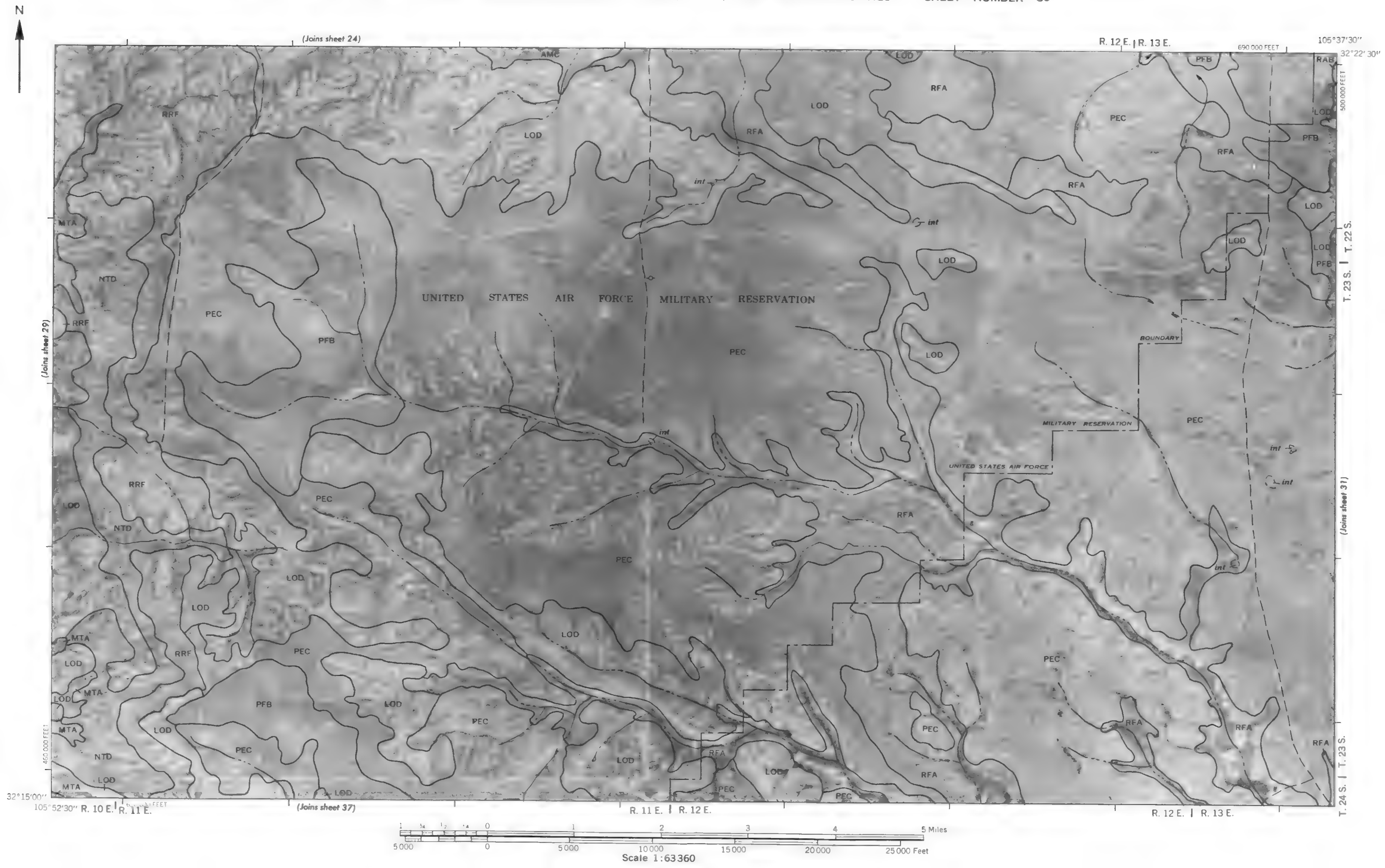
Coordinate grid ticks and land division corners, if shown, are approximately positioned

SOIL SURVEY OF OTERO AREA, NEW MEXICO, PARTS OF OTERO, EDDY, AND CHAVES COUNTIES — SHEET NUMBER 30



Coordinate grid ticks and land division corners, if shown, are approximately positioned

Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974, 1975, and 1977 aerial photography.

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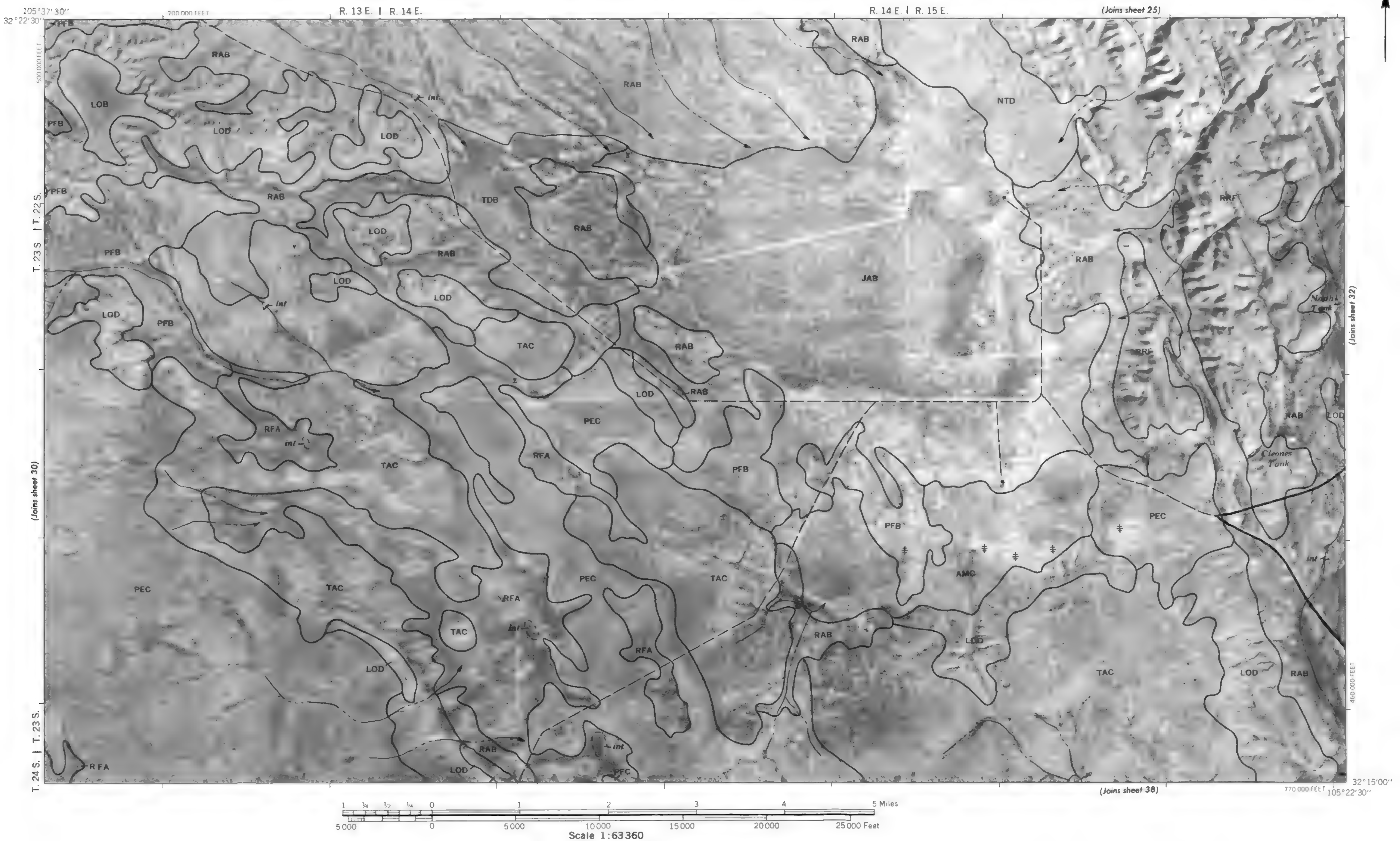

Scale 1:63 360

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies

Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974, 1975, and 1977 aerial photography

Coordinate grid ticks and land division corners, if shown, are approximately positioned

SOIL SURVEY OF OTERO AREA, NEW MEXICO, PARTS OF OTERO, EDDY, AND CHAVES COUNTIES — SHEET NUMBER 32

Coordinate grid ticks and land division corners, if shown, are approximately positioned

Base maps are orthophotographs prepared by the U S Department of the Interior, Geological Survey, from 1974 1975, and 1977 aerial photography

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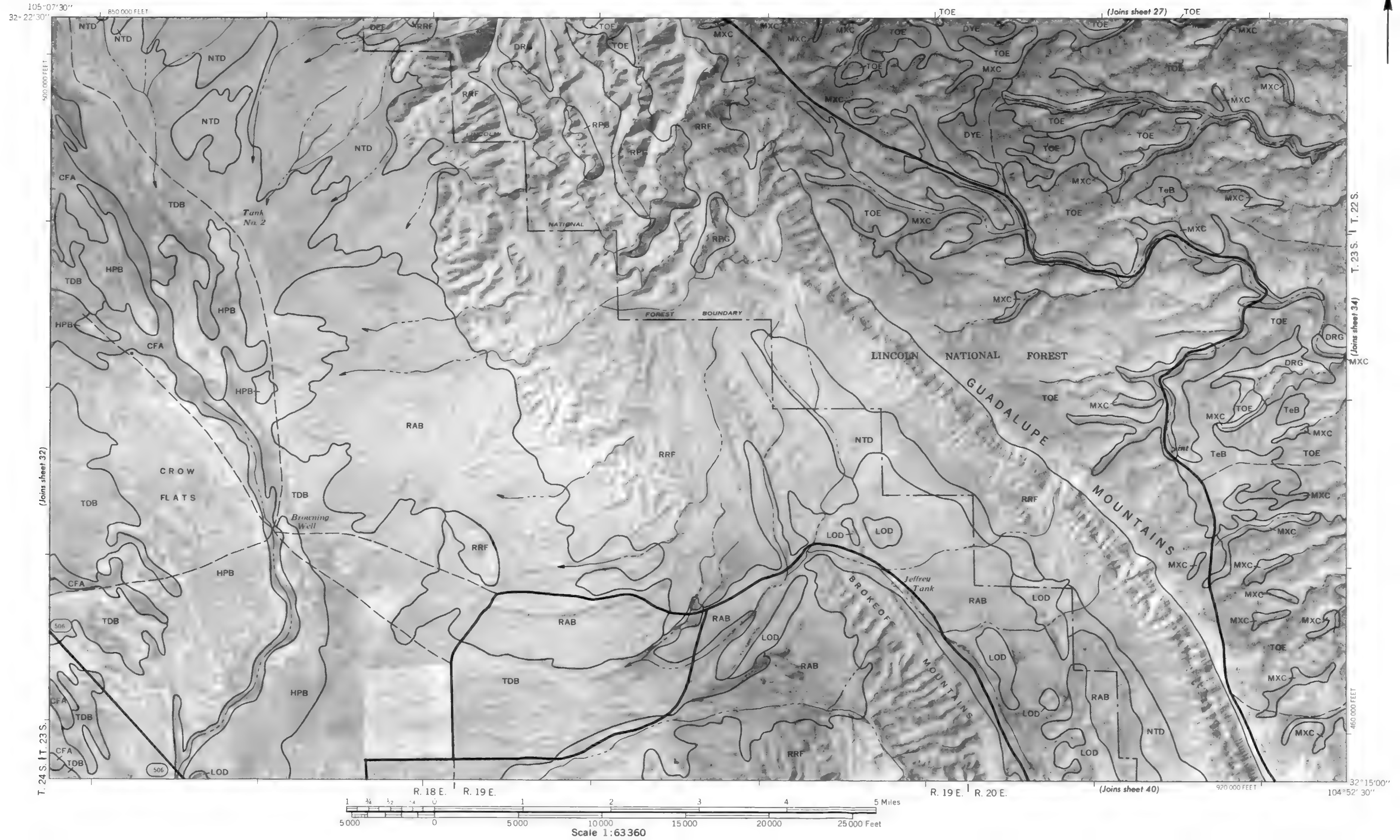
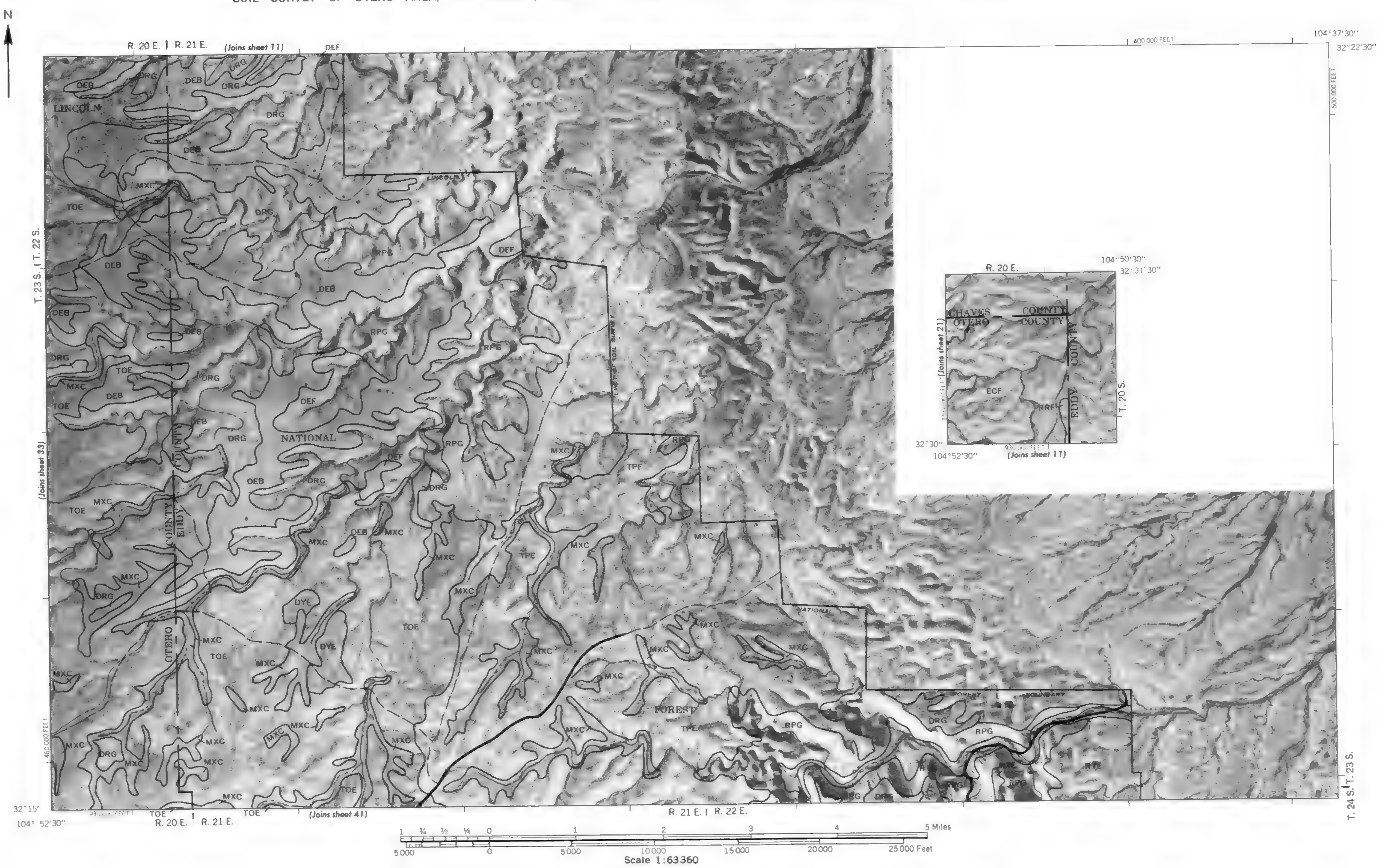
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



SOIL SURVEY OF OTERO AREA, NEW MEXICO, PARTS OF OTERO, EDDY, AND CHAVES COUNTIES — SHEET NUMBER 34



Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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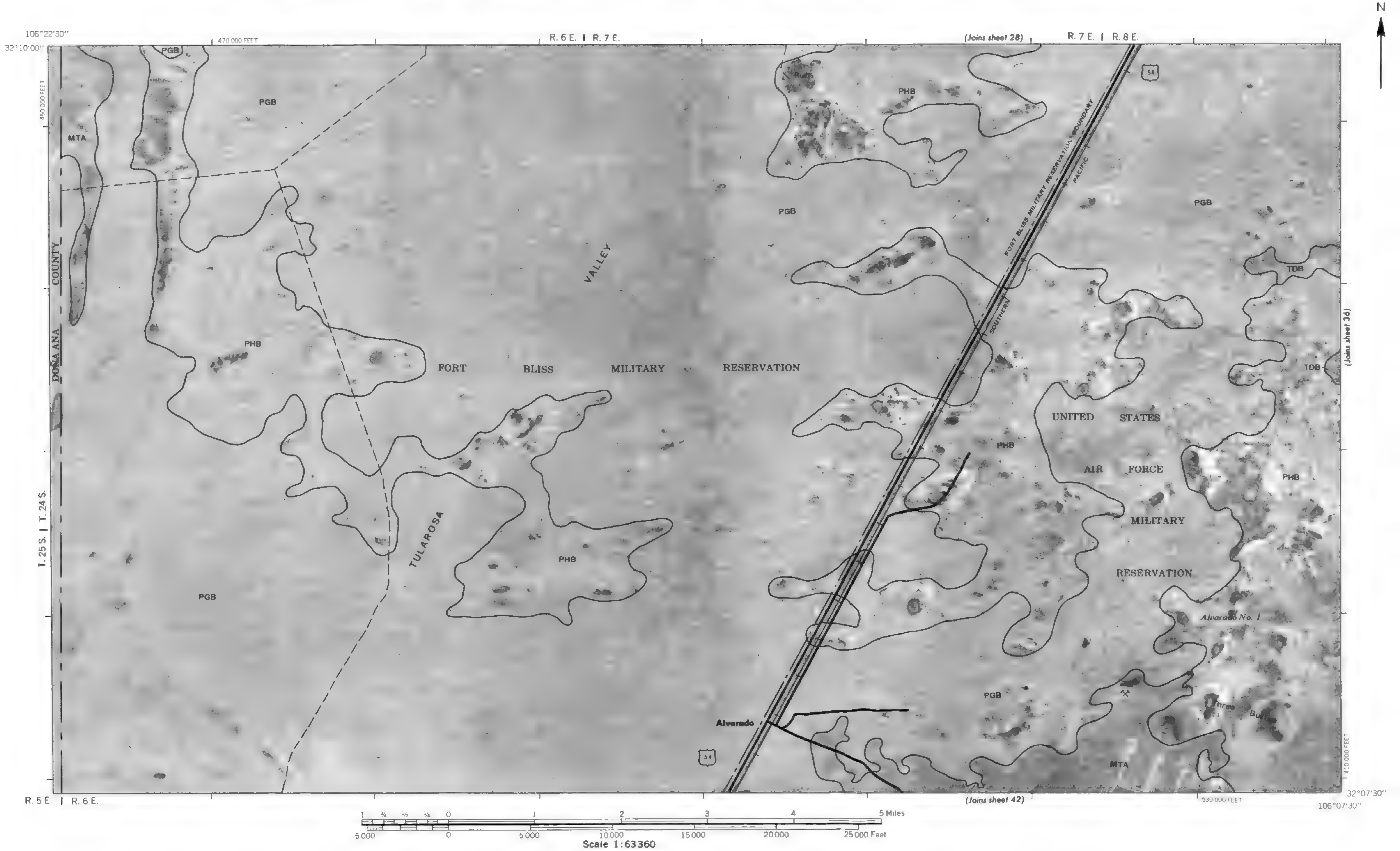
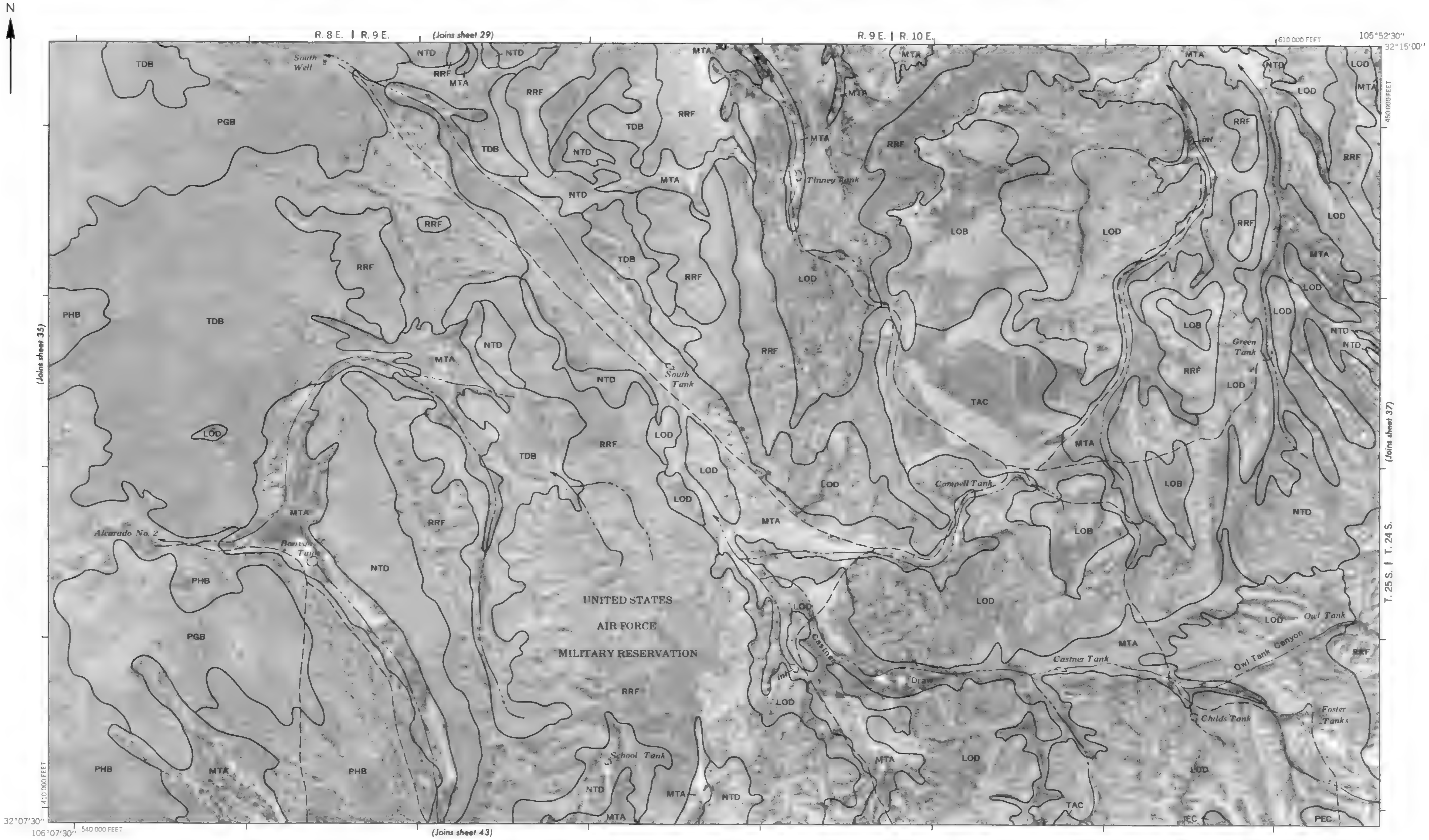
Coordinate grid ticks and land division corners, if shown, are approximately positioned



SOIL SURVEY OF OTERO AREA, NEW MEXICO, PARTS OF OTERO, EDDY, AND CHAVES COUNTIES — SHEET NUMBER 36



0 1 2 3 4 5 Miles

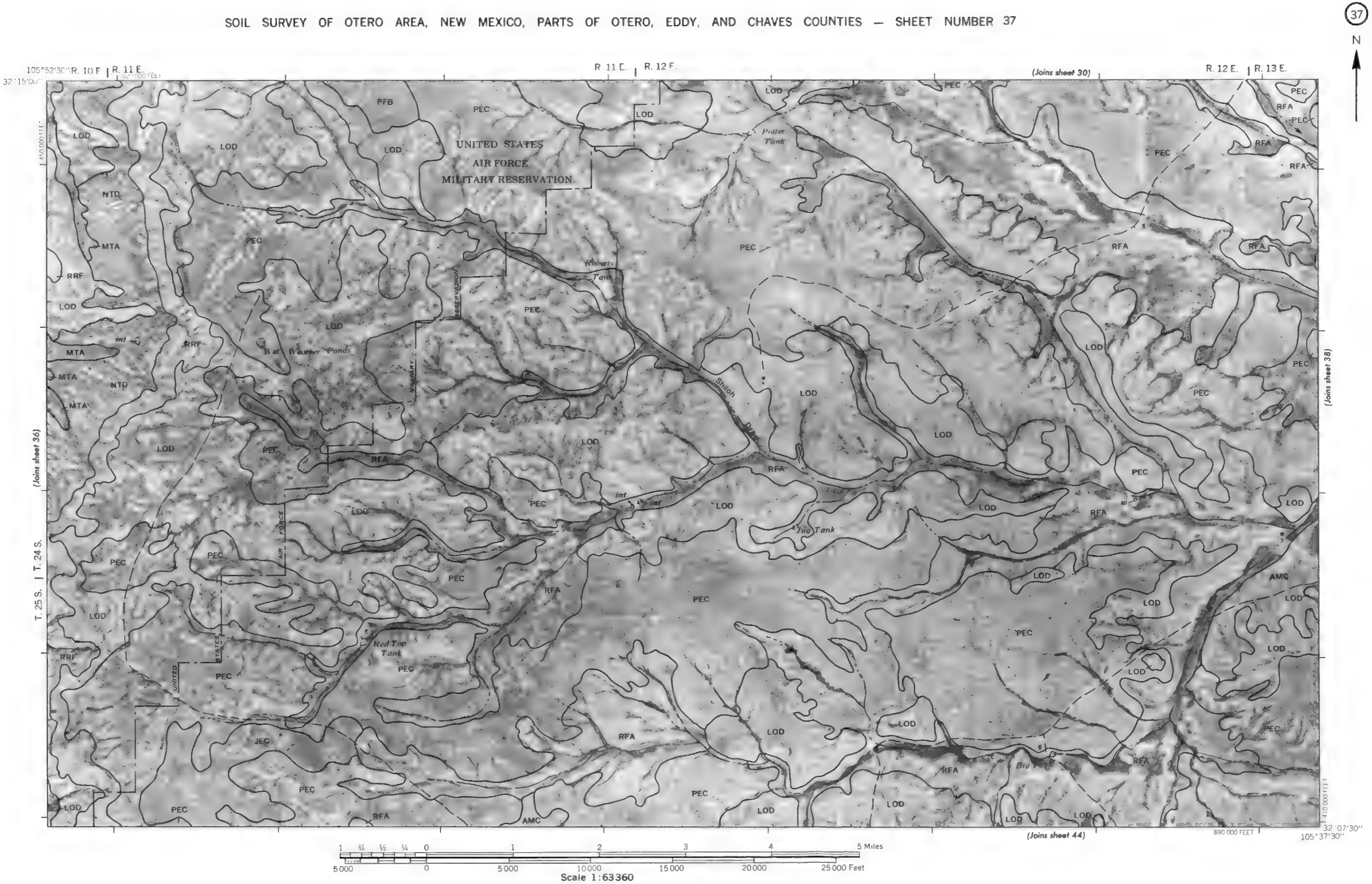
5000 0 5000 10000 15000 20000 25000 Feet

Scale 1:63 360

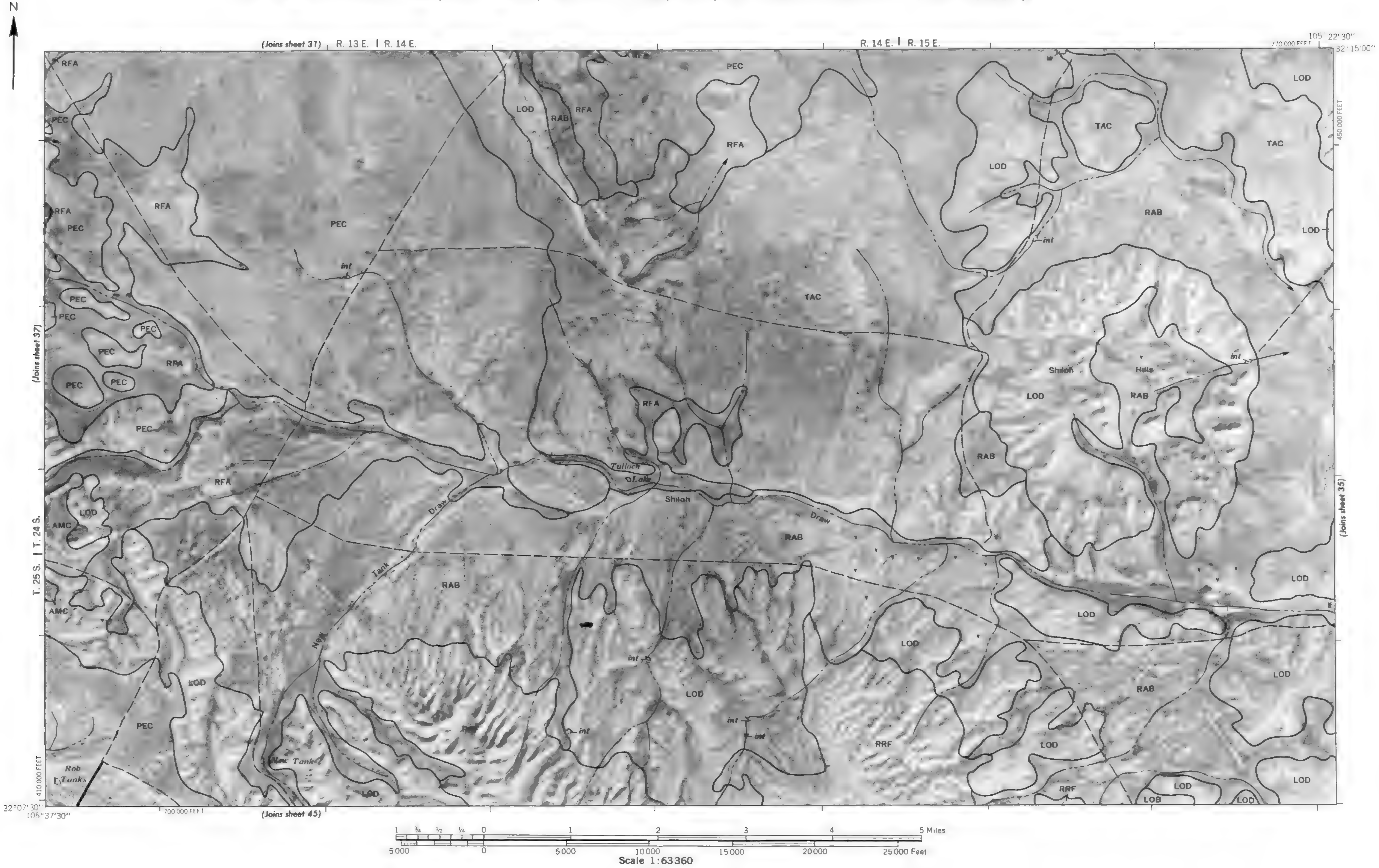
Coordinate grid ticks and land division corners, if shown, are approximately positioned

Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974, 1975, and 1977 aerial photography

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974, 1975, and 1977 aerial photography
Coordinate grid ticks and land division corners, if shown, are approximately positioned



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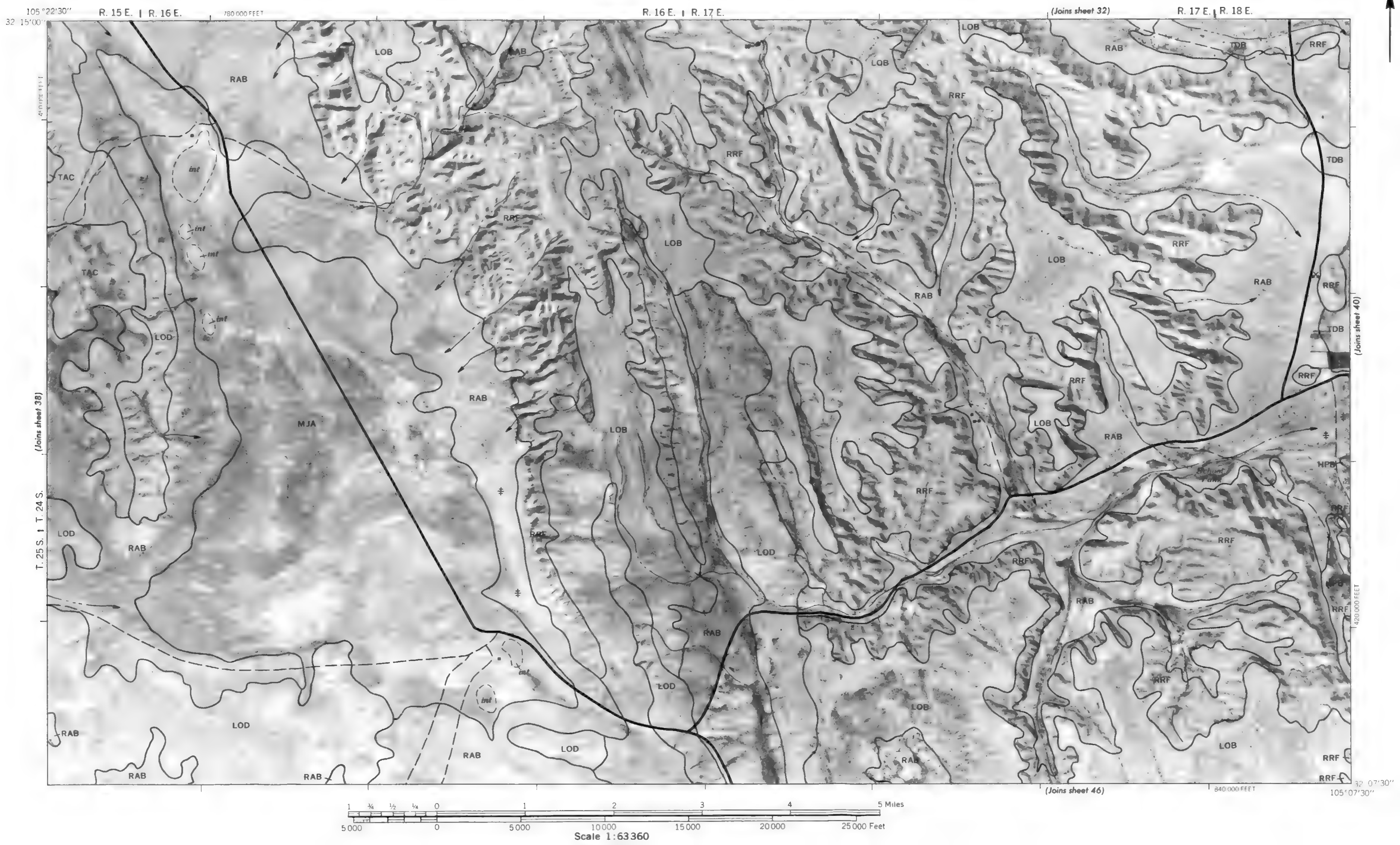
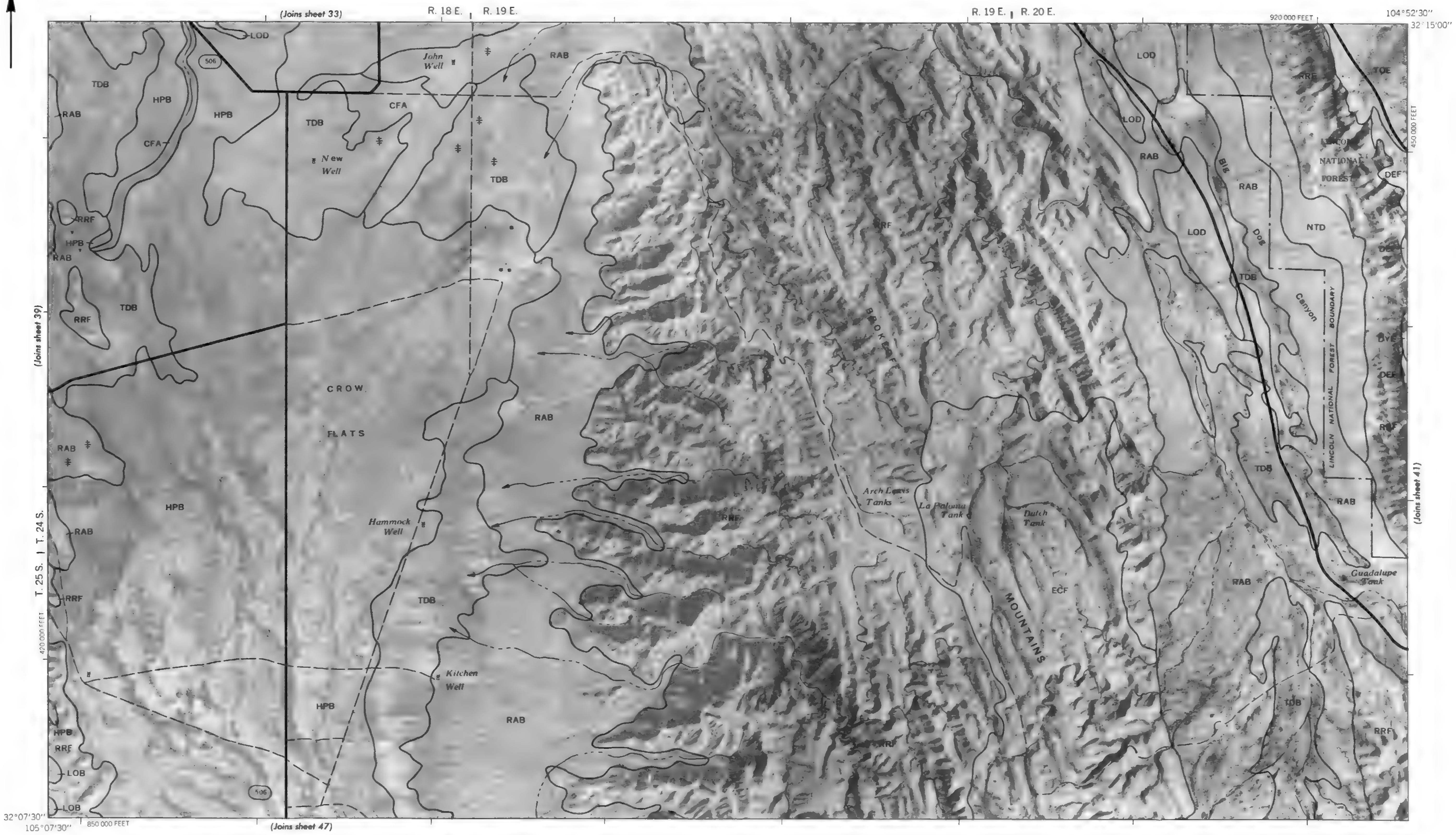


SOIL SURVEY OF OTERO AREA, NEW MEXICO, PARTS OF OTERO, EDDY, AND CHAVES COUNTIES — SHEET NUMBER 40



1 ¾ ½ ¼ 0 1 2 3 4 5 Miles

5000 0 5000 10000 15000 20000 25000 Feet

Scale 1:63 360

Coordinate grid ticks and land division corners, if shown, are approximately positioned

Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974, 1975, and 1977 aerial photography

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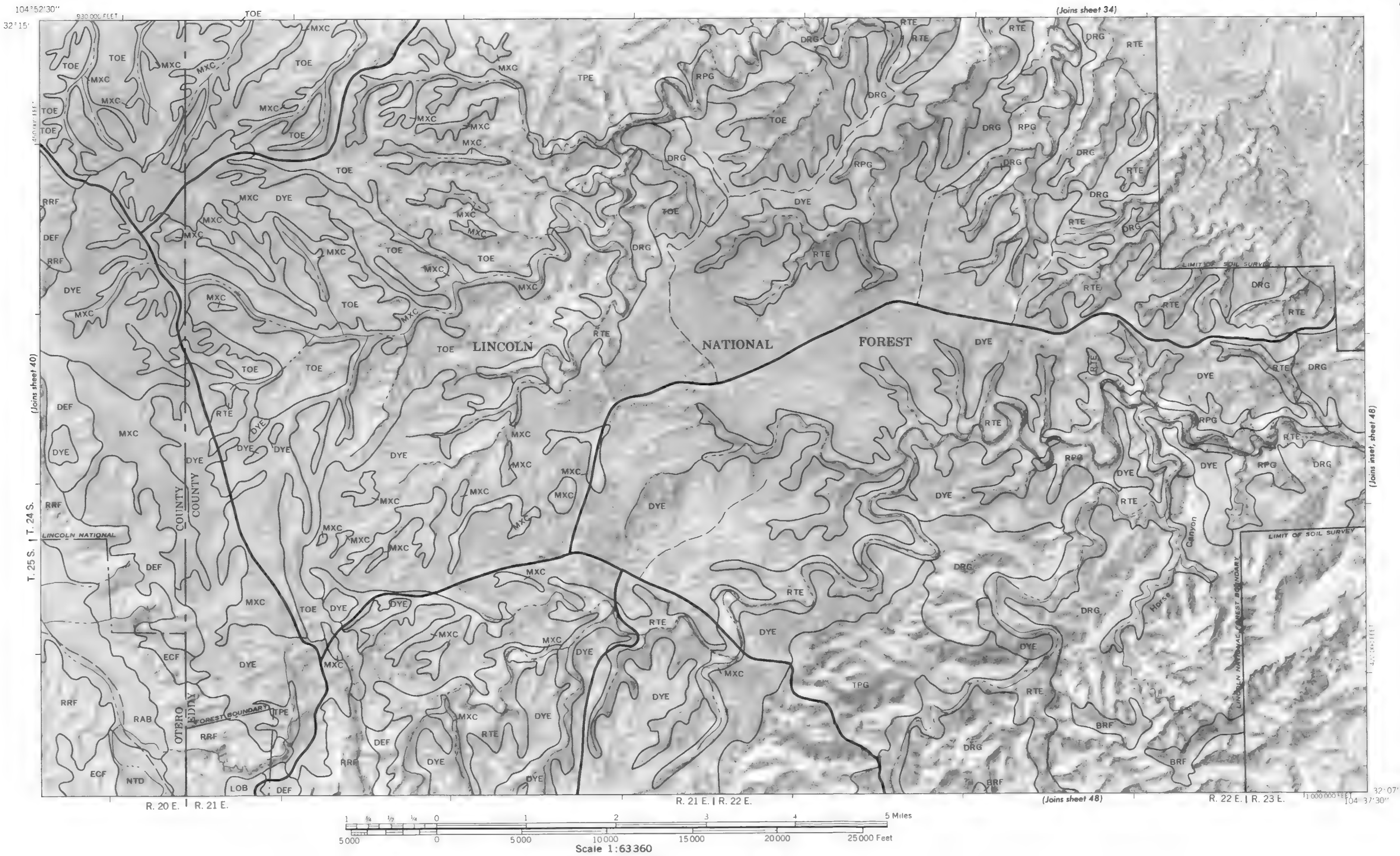

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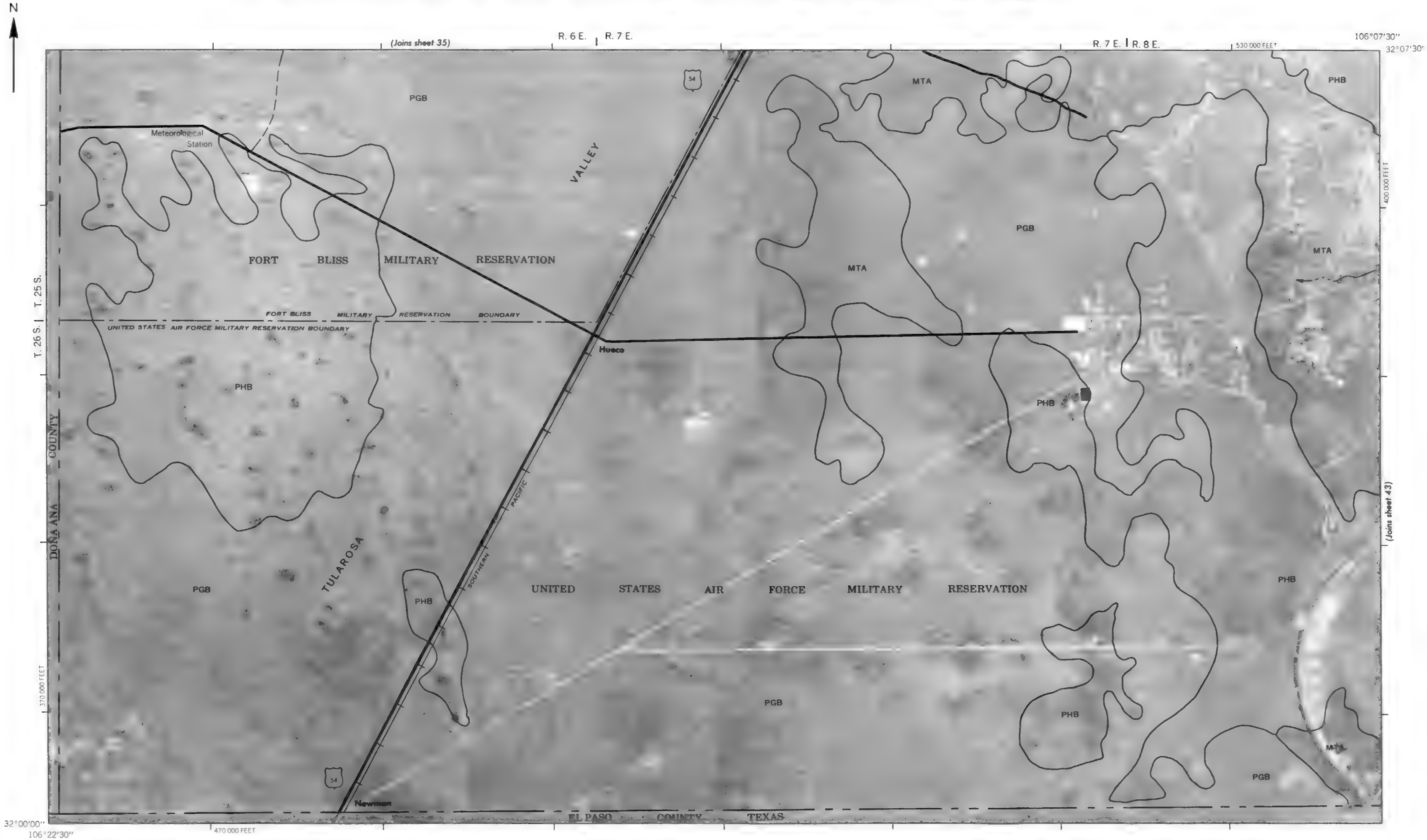
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF OTERO AREA, NEW MEXICO, PARTS OF OTERO, EDDY, AND CHAVES COUNTIES — SHEET NUMBER 42



1 ¾ ½ ¼ 0 1 2 3 4 5 Miles

5000 0 5000 10000 15000 20000 25000 Feet

Scale 1:63 360

Coordinate grid ticks and land division corners, if shown, are approximately positioned.

Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974, 1975, and 1977 aerial photography.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies

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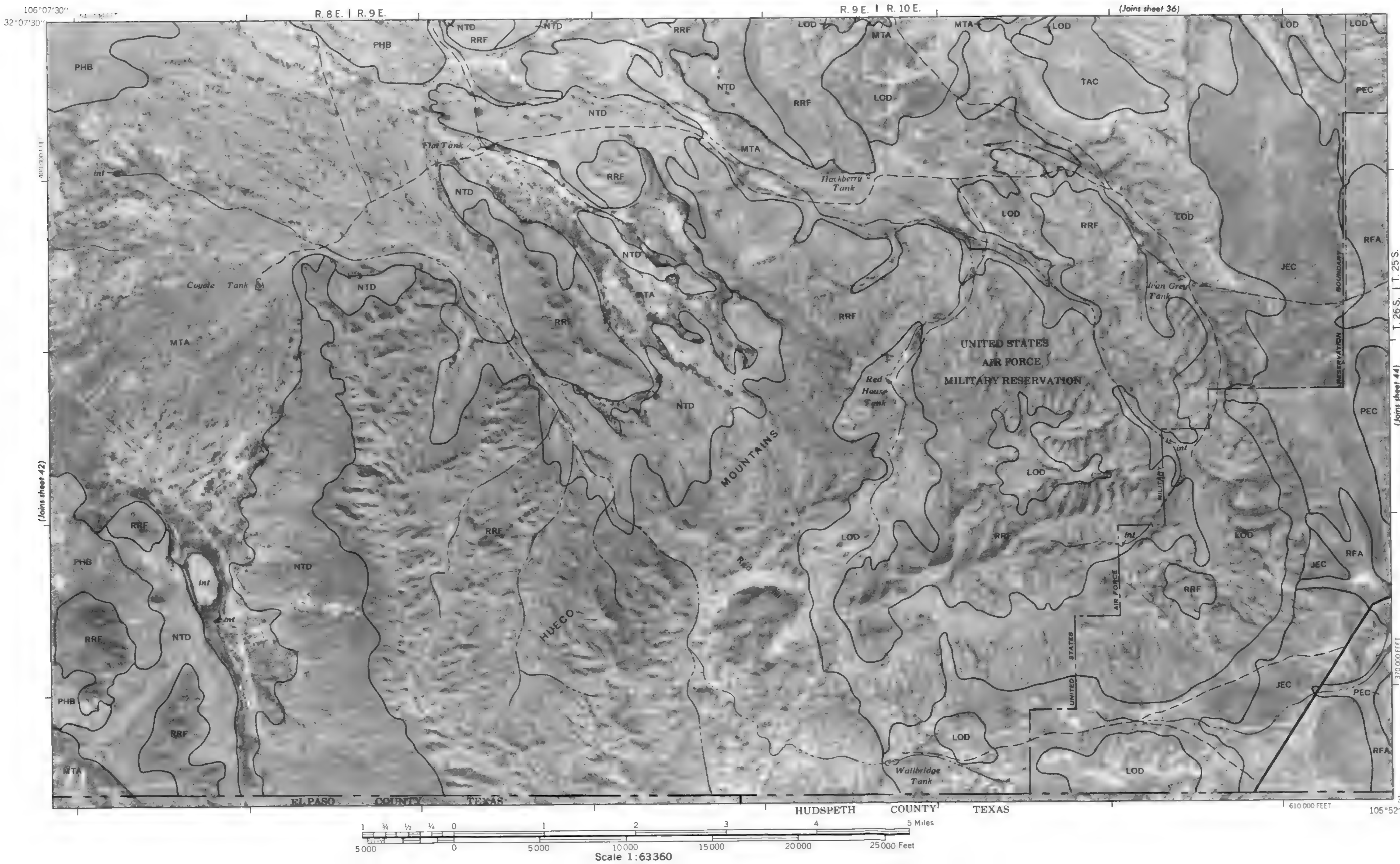

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
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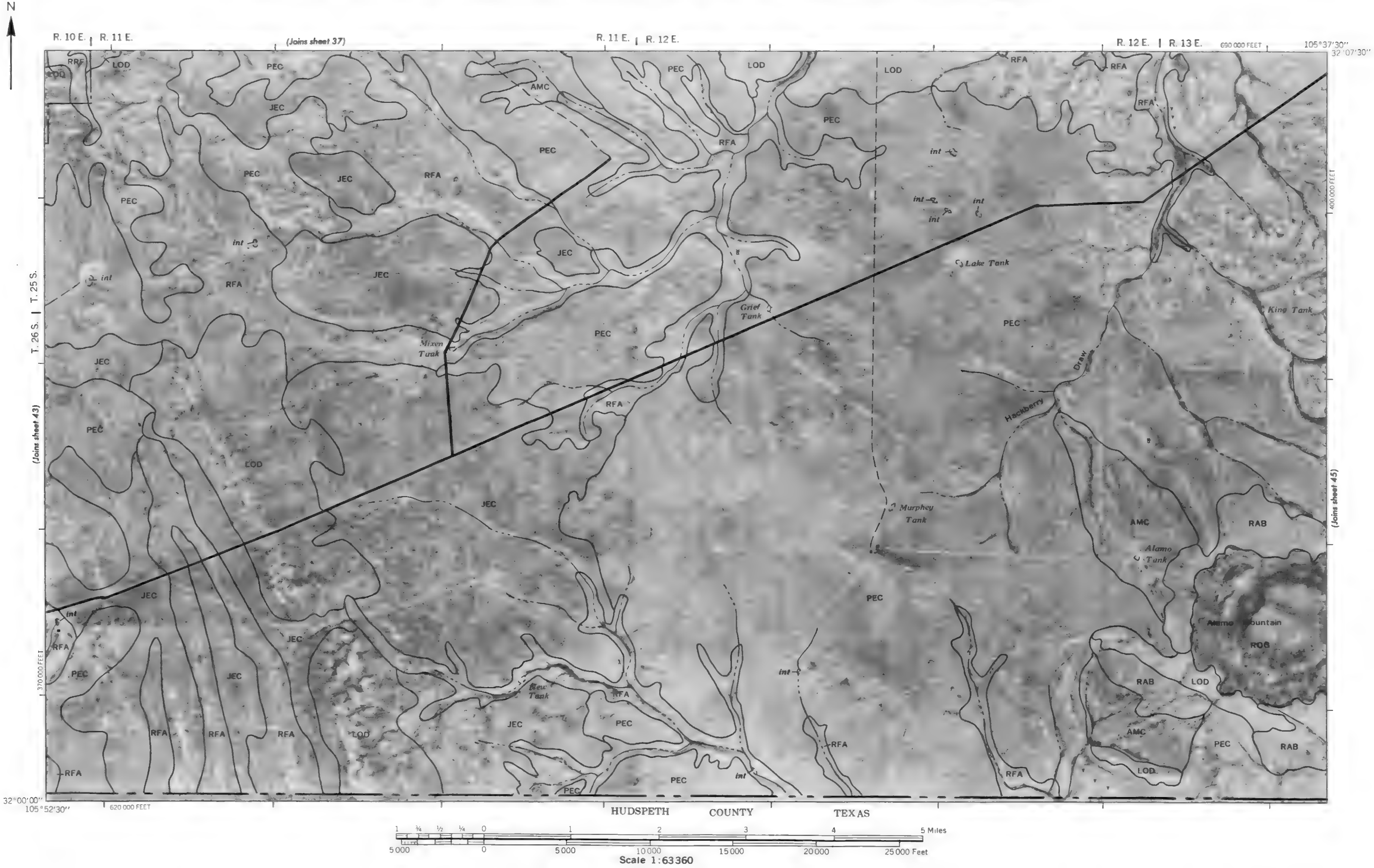
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF OTERO AREA, NEW MEXICO, PARTS OF OTERO, EDDY, AND CHAVES COUNTIES — SHEET NUMBER 44



Coordinate grid ticks and land division corners, if shown, are approximately positioned

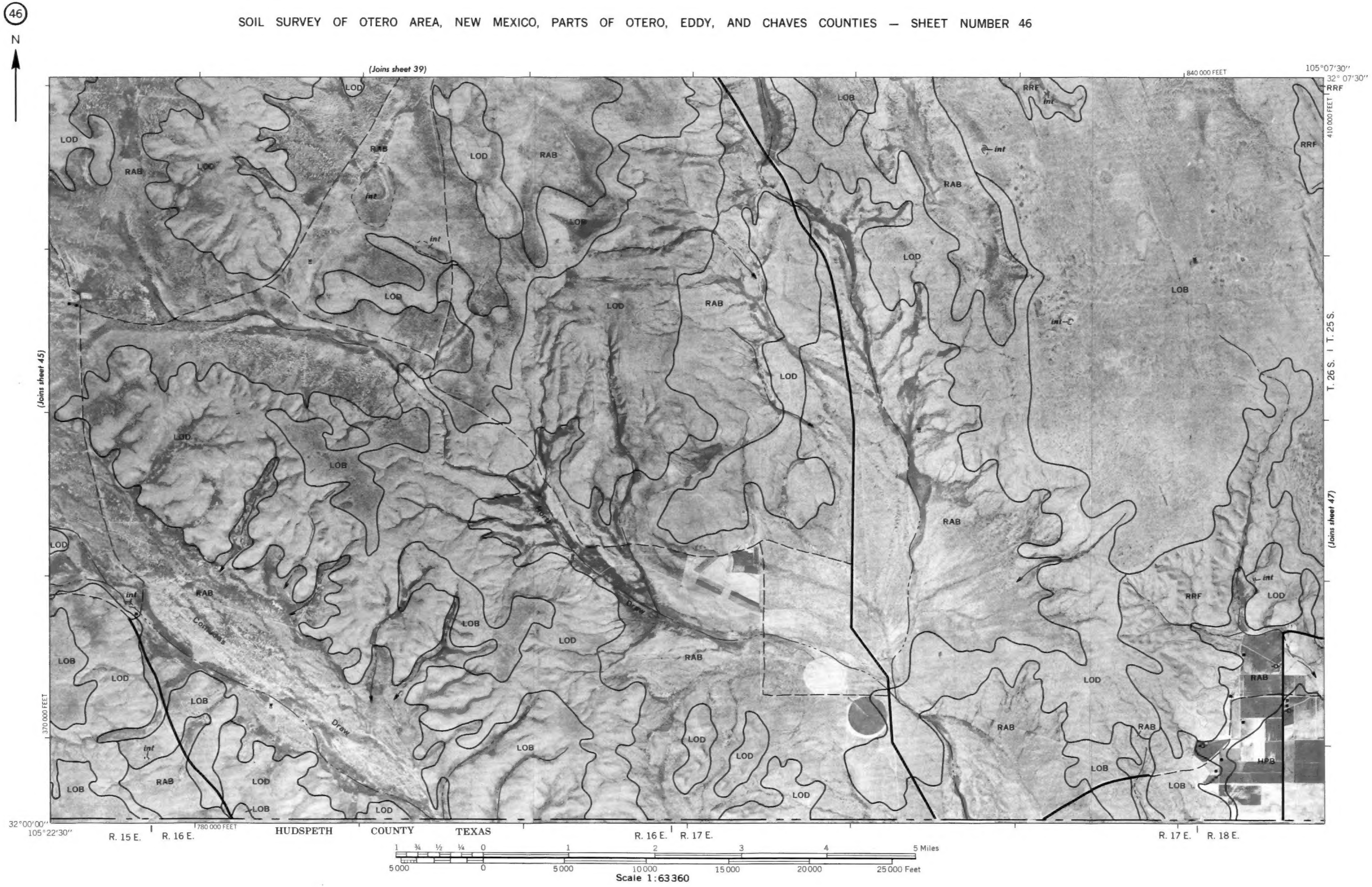
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974, 1975, and 1977 aerial photography

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

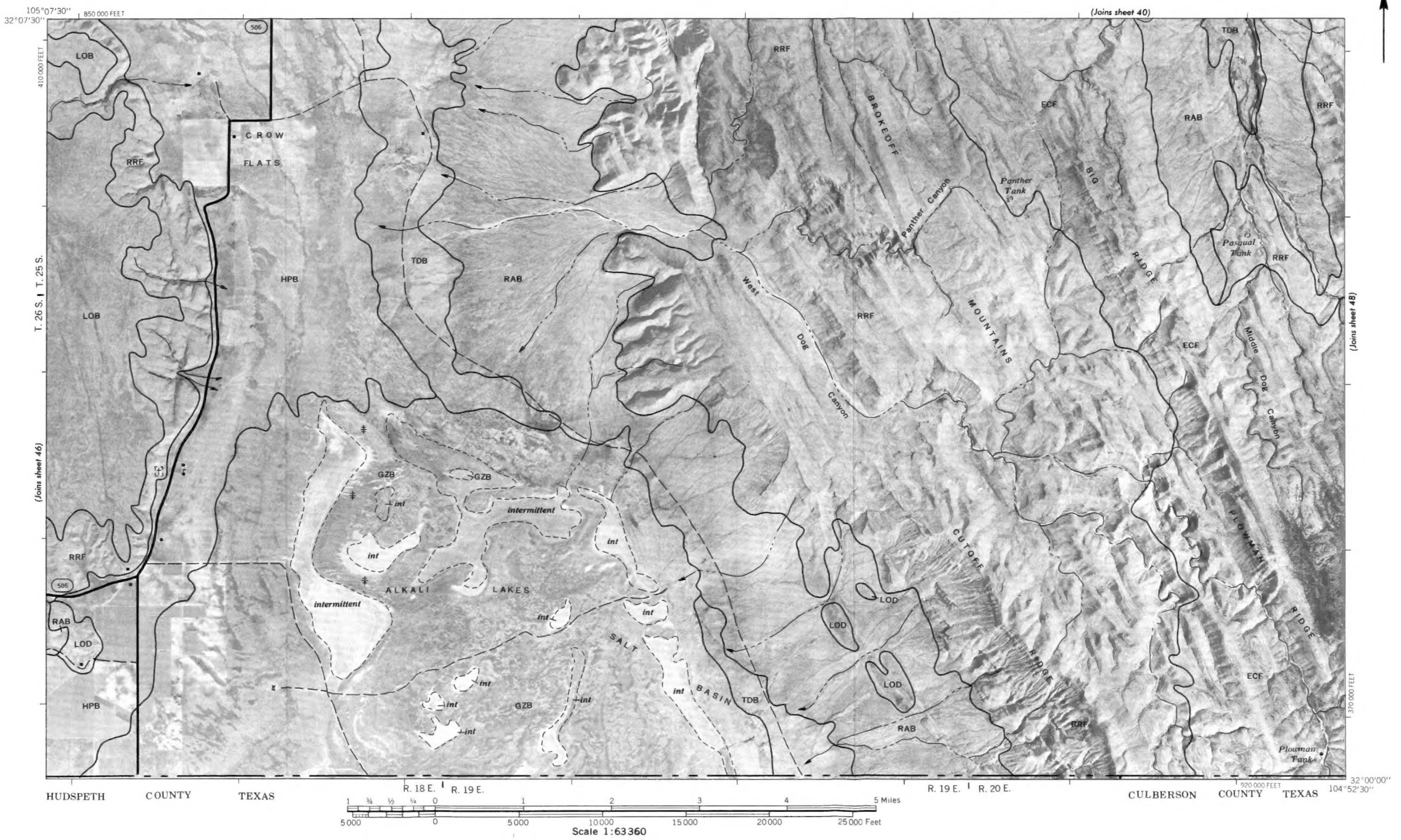
SOIL SURVEY OF OTERO AREA, NEW MEXICO, PARTS OF OTERO, EDDY, AND CHAVES COUNTIES — SHEET NUMBER 45

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974, 1975, and 1977 aerial photography.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF OTERO AREA, NEW MEXICO, PARTS OF OTERO, EDDY, AND CHAVES COUNTIES — SHEET NUMBER 46



Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974, 1975, and 1977 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.



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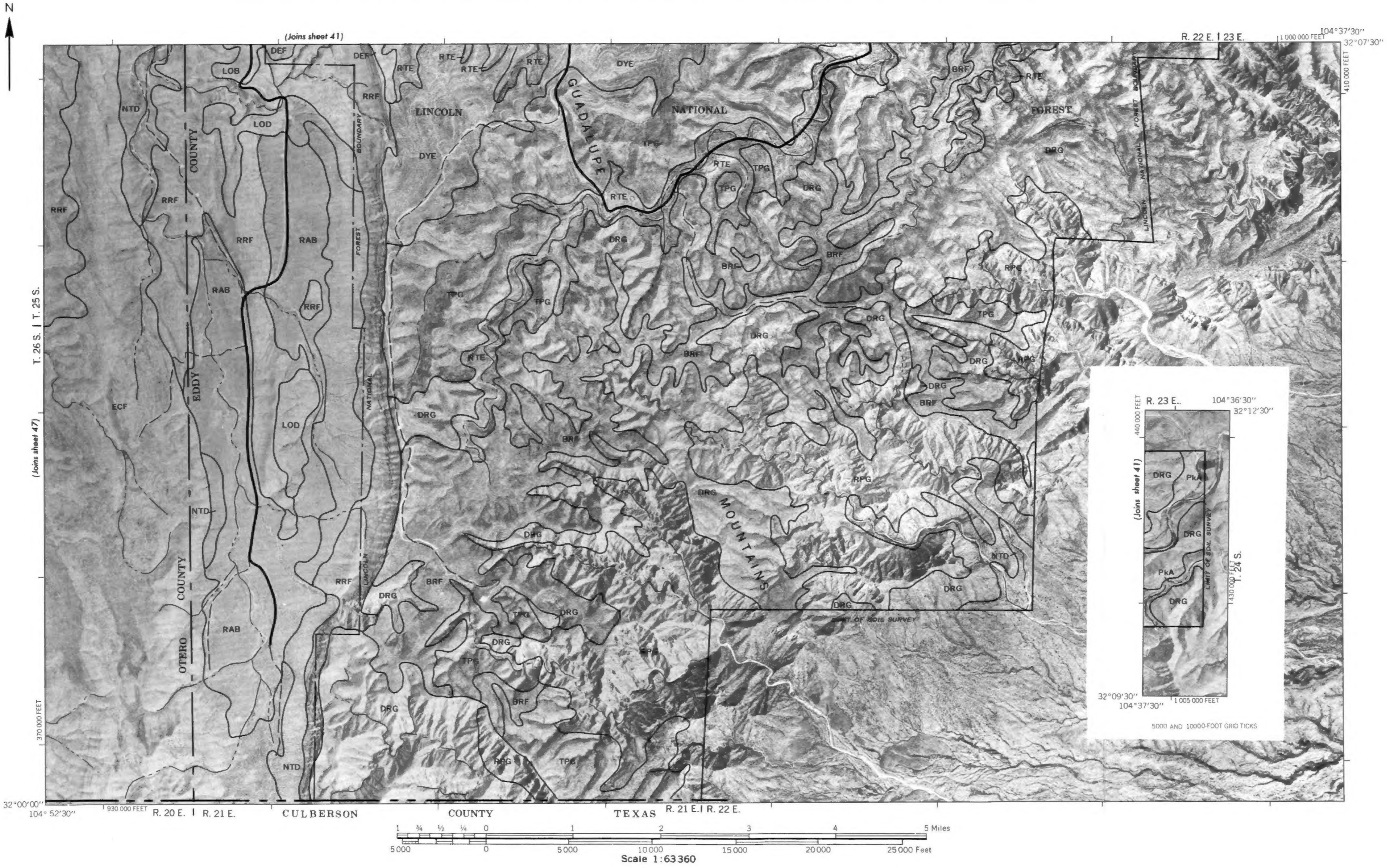
SOIL SURVEY OF OTERO AREA, NEW MEXICO, PARTS OF OTERO, EDDY, AND CHAVES COUNTIES — SHEET NUMBER 48



Coordinate grid ticks and land division corners, if shown, are approximately positioned.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974, 1975, and 1977 aerial photography.
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.